Histopathologic Correlation in Dermoscopy

A Micropunch Technique

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Background: Dermoscopy is a simple-to-use, in vivo method for the diagnosis of malignant melanoma and the differential diagnosis of pigmented skin lesions. It uses an immersion technique and optical magnification to visualize structures not visible to the naked eye. The anatomo-clinical correlation of dermoscopic with histopathologic findings is important, and while many articles have described different techniques to achieve this goal, no direct correlation with a visual control has been described. We recently developed a micropunch technique that allows for the first time this direct correlation.

Observations: After applying local anesthesia, the physician makes a superficial round incision using a 1-mm micropunch in the area of interest and leaves the punch in place. The lesion is documented using digital dermoscopy before and after surgery. Using these images, the laboratory technicians can easily visualize the precise site of the punch and its correlation with the initial dermoscopic image, and the sections are chosen in a way that they pass through the punch incision. The punch incision can be easily identified in the histopathologic slides because of its clear-cut borders. Since the punch always stays in place, this technique does not interfere with the interpretation of the slides (e.g., measurement of the Breslow thickness).

Conclusions: The advantages of our technique are that it is easy to perform by any clinician in any setting after a short setup and training period for the clinician and the laboratory technicians. Unlike with other techniques, the physician need not be present at the laboratory at the moment of the step sectioning. It can be performed in private practice and for many other indications besides pigmented skin lesions. Finally, since this technique allows for the first time a direct correlation between dermoscopic and histopathologic findings, the clinician will be able to “guide” the pathologist and indicate the precise areas of interest or suspicion.

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DERMOSCOPY is a simple-to-use, in vivo method for the diagnosis of malignant melanoma and the differential diagnosis of pigmented skin lesions. In the hands of an experienced physician, it has been shown to increase diagnostic accuracy compared with clinical visual inspection.1-10 Dermoscopy uses an immersion technique and optical magnification to visualize structures of the epidermis, dermo-epidermal junction, and the dermis. Its use allows the identification of many structures not visible to the naked eye.

Many pathologists have worked on the histopathologic correlation of these structures,6,8,9,11-15 but this anatomo-clinical correlation has 2 important methodologic limitations8: (1) The dermoscopist has only a horizontal overview of the pigmented skin lesion, and the pathologist has only a partial (local) vertical view of different parts (sections) of the lesion. (2) Neither the dermoscopist nor the pathologist knows in which axis the surgeon removed the lesion and to which part of the dermoscopy image the histopathologic slide corresponds.

REVIEW OF THE LITERATURE

Soyer et al12 published the first article in English that correlates dermoscopic features with histologic step sections. Yadav et al15 published a study on histopathologic correlation of dermoscopic structures in 1993. This later study documented the lesions with a Dermaphot camera (Heine AG, Herrsching, Germany) prior to surgical excision. They also took a Polaroid image of the lesion in vivo to document the precise orientation (Polaroid Corporation, Waltham, Mass). After surgery, an orienting suture was placed at one pole of the specimen before the specimen was preserved in formalin. In
the laboratory, the sides of the specimen were labeled with ink, and step sections were cut in the presence of one of the authors. The exact placement of step sections was drawn onto the Polaroid picture of the lesion. This Polaroid image as well as the dermoscopic image accompanied the histopathologic slides so that the pathologist was able to compare the structures seen on dermoscopy and the features in the stained sections. Interestingly, however, the authors did not perform a case-by-case correlation. They showed the best clinical and dermoscopic examples of a given finding and the best available photomicrographs of histologic correlates, but the documents were not necessarily from the same case.12,15

More recently, Soyer et al13 reported a sophisticated method using a standardized gross pathology protocol and digital dermoscopy for a case-by-case correlation. All lesions were documented using dermoscopy. After surgery, the specimens were oriented with stitches of suture material to preserve the orientation and were transported immediately to the dermatopathology laboratory. Polaroid photographs were taken from all specimens ex vivo indicating the precise place of the initial gross cut. According to the authors, this technique “allows the identification of the approximate location of the histologic section on each dermoscopic image.”13, The dermoscopic images were digitally enhanced so that dermoscopic features could be more precisely located and correlated with the corresponding histopathologic structures. This is a very precise method but does still not allow a “direct” correlation between histopathologic and dermoscopic findings with a visual control.

MICROPUNCH TECHNIQUE

We recently developed a micropunch technique that allows for the first time this direct correlation. Our method combines digital dermoscopy with standardized gross pathology protocol and allows the identification in a histopathologic slide of any structure that measures 1 mm or less in vivo. Pigmented skin lesions were systematically documented prior to surgery using a device for digital dermoscopy (DermoGenius Ultra; Linos AG, Munich, Germany). After local anesthesia was applied, a superficial round incision was made using a 1-mm micropunch (usually used for hair transplantation) in the area of interest (similar to the cleft in Mohs micrographic surgery). In contrast to the usual technique, the punch was left in place while surgery was performed as usual.

After surgery, an orienting suture was placed at one pole of the specimen to indicate the orientation, and a second digital dermoscopic image was taken to identify the orientation and to precisely document the site of the micropunch. The specimen was then fixed in 10% buffered formalin. The digital dermoscopic images (before and after surgery) were printed immediately and sent to the laboratory together with the sample. The punch (still in place) could be easily visualized by the laboratory technicians even though the sample was formalin fixed because of the accompanying print of the in vivo image and the orientation (stitch). The step sections were chosen to include the site of the micropunch. The punch was easily identified in the histopathologic slides because of its clear-cut borders. Since the punch always stays in place, this technique does not interfere with the interpretation of the slides (eg, measure of Breslow thickness).

Figure 1 shows an example of a symmetric pigmented skin lesion (Reed nevus) with a single irregular extension at the periphery. Figure 1C shows the precise site of the punch incision. In all our examples, the orienting suture was placed on the left side of the specimen.

Figure 2A shows a histopathologic view of the lesion at ×25 magnification. The micropunch can be easily identified in the periphery of the lesion (arrows). Figure 2B shows nests of pigmented, spindle-shaped melanocytes at the dermoepidermal junction and in the superficial dermis as well as the presence of numerous melanophages in the dermis (original magnification ×100). Figure 2C shows the zone of the micropunch with a hyperpigmentation in the corneified layer and also in the epidermis. Note the full-thickness epidermal hyperpigmentation and numerous melanophages in the superficial dermis on the left half of the punched area. There are no nests of melanocytes (original magnification ×100).

COMMENT

This technique could also be adapted for use with conventional dermoscopy and a Polaroid picture of the specimen (to identify the site of the micropunch). We chose a system for digital dermoscopy because it allows easy storage and retrieval of dermoscopy images and patient data. Additionally, digital images are immediately available. The technique could be enhanced by drawing lines on the print of the digital dermoscopy image to indicate the precise location of the step sections,13 but since our method allows a direct correlation (the micropunch is visible on the histopathologic slide), this additional information does not confer any advantage over the micropunch technique alone.

The advantages of our technique are that it is easy to perform by any clinician in any setting after a short setup and training period for the clinician and the laboratory technicians. Unlike with other techniques, the phy-

Figure 1. A, Clinical picture of a pigmented skin lesion; B, dermoscopic image of Figure 1A, a symmetric pigmented skin lesion with an irregular extension in the periphery; and C, the precise location of the punch biopsy specimen (encircled).
sician need not be present at the laboratory at the moment of the step sectioning. It can be performed in private practice and for many other indications besides pigmented skin lesions. Finally, since this technique allows for the first time a direct correlation between dermoscopic and histopathologic findings, the clinician will be able to “guide” the pathologist16 and indicate the precise areas of interest or suspicion.

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Figure 2. A, The excised specimen shows a pigmented spindle cell nevus in the center. The micropunch is seen on the left (arrows) (original magnification ×25). B, Detail of Figure 2A showing nests of pigmented, spindle-shaped melanocytes at the dermoeipidermal junction and in the superficial dermis. Note also the presence of numerous melanophages in the dermis (original magnification ×100). C, The zone of the micropunch (edges indicated by arrows) shows a hyperpigmentation in the cornified layer and in the epidermis. Note the full-thickness epidermal hyperpigmentation and numerous melanophages in the superficial dermis on the left half of the punched area. There is no increase in the number of melanocytes, and no nests of melanocytes are seen (original magnification ×100).