The Furrow Ink Test

A Clue for the Dermoscopic Diagnosis of Acral Melanoma vs Nevus

Ralph Peter Braun, MD; Luc Thomas, MD, PhD; Isabel Kolm, MD; Lars E. French, MD; Ashfaq A. Marghoob, MD

Background: Dermoscopy is a helpful tool that can assist experienced users improve the diagnostic accuracy for pigmented lesions in acral sites. As a simplification, one can assume that if pigment is found predominantly in the furrows, the lesion can be considered benign, and if the pigmentation is present predominantly on the ridges, the lesion should be considered malignant. The differentiation between furrows and ridges is the main clue for the diagnosis, but this can sometimes be difficult to discern. For this reason, we describe a simple in vivo technique that makes this task much easier for the clinician.

Observations: Liquid ink (ie, from a fountain pen) should be applied directly onto the lesion. The ink should be left on the skin for a few seconds to allow the ink to penetrate into the furrows. The excess ink should then be wiped off. The ink will at first diffusely color the entire skin surface. The subsequent cotton swab wiping will only remove the ink on the skin overlying the ridges. The furrows will retain the stain and become clearly visible on dermoscopic examination as thin inked lines. This in turn will make it easy to evaluate whether the melanin pigmentation follows the ink lines (benign pattern) or if the pigmentation is located in between these ink lines (malignant pattern).

Conclusion: The furrow ink test is a quick and easy method to facilitate the correct identification of furrows and ridges on volar skin and facilitates dermoscopic diagnosis of pigmented lesions in acral sites.

Arch Dermatol. 2008;144(12):1618-1620

Dermoscopy is a helpful tool that can assist experienced users in differentiating between melanoma and benign melanocytic nevi. It is important for the dermoscopist to remember that the dermoscopic structures and patterns visible in lesions on volar surfaces differ from those on nonglabrous skin. This difference is primarily due to the distinctive anatomy of the skin of the palms and soles, which is composed of furrows and ridges and which in turn gives rise to each individual’s unique dermatoglyphic pattern. Glabrous skin also contains many eccrine sweat glands that open only on the surface of the ridges. Furthermore, histologic evaluation of melanocytic tumors has revealed that nevus cells tend to aggregate near the dermoepidermal junction of the crista limitans, which corresponds to the furrows, and melanoma cells in the early phases tend to aggregate near the crista intermedia, which corresponds to the ridges. It stands to reason that if the clinician observes pigment predominantly in the furrows (ie, parallel furrow pattern and latticelike pattern), then the lesion can be considered to be benign, whereas if the pigmentation is present predominantly on the ridges (parallel ridge pattern), the lesion should be considered malignant. In fact, the parallel ridge pattern has been found to be the most sensitive sign for acral melanoma. However, for the clinician to determine if a pigmented volar melanocytic lesion is benign or malignant, he or she has to correctly identify the furrows and ridges and has to determine which of these structures the pigmentation follows. The ridges can be identified by fact that they have a wider width compared with the furrows, and they also contain the eccrine ductal openings, which can often be observed using dermoscopy. Although this sounds like a simple task, it can sometimes prove difficult to differentiate between furrows and ridges. To help the clinician in distinguishing between ridges and furrows, we elaborated a simple in vivo “stain.”

Methods

Akin to the burrow ink test and the cornoid lamella ink test, which have been described...
for the clinical diagnosis of scabies and porokeratosis, respectively, we named our observation the *furrow ink test*. Prior to executing the furrow ink test, the lesion should be evaluated clinically and dermoscopically (Figure 1A and B). Once this has been accomplished, liquid ink (ie, from a fountain pen) should be applied directly onto the lesion. The ink should be left on the skin for a few seconds to allow it to penetrate into the furrows. The excess ink should then be wiped off using a cotton swab. The ink will at first diffusely color the entire skin surface. The subsequent cotton swab wiping will only remove the ink on the skin overlying the ridges. The furrows will retain the stain and become clearly visible on dermoscopic examination as thin inked lines (Figure 1C). This will make it easy to evaluate whether the melanin pigmentation follows the ink lines (ie, parallel furrow pattern) (Figure 1C) or if the pigmentation is located in between these ink lines, thus representing a parallel ridge pattern (Figure 2).

COMMENT

Another interesting observation made by us was that initial vigorous rubbing of the skin with alcohol pads followed by the application of ink results in the accentuation of the eccrine pores by ink, thereby making it easy to identify the ridge. We theorize that the vigorous rubbing of the skin with alcohol results in the removal of keratin from around the eccrine pores and furrows. This results in less ink adhering to the furrow, while allowing the ink to enter the openings of eccrine pores.

The furrow ink test is a quick and easy method to facilitate the correct identification of furrows and ridges on volar skin. This in turn can help clinicians in distinguishing between benign and malignant pigmented melanocytic tumors of the palms and soles.

Accepted for Publication: January 28, 2008.
Correspondence: Ralph Peter Braun, MD, Department of Dermatology, University Hospital Zürich, Gloriastrasse 31, CH–8091 Zürich, Switzerland (braun@melanoma.ch).
Author Contributions: Dr Braun had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Braun, Thomas, Kolm, and French. Acquisition of data: Braun, Thomas, Kolm, and French. Analysis and interpretation of data: Braun, Thomas, Kolm, French, and Marghoob. Drafting of the manuscript: Braun. Critical revision of the manuscript for important intellectual content: Braun, Thomas, Kolm, French, and Marghoob. Administrative, technical, and material sup-

Figure 1. Junctional nevus on the lateral right foot. A, Clinical image. B, Dermoscopic findings showing a benign latticelike pattern; however, it may be difficult for some clinicians to appreciate that the pigmentation is following the furrows. C, Dermoscopic findings of the lesion in panel A showing the furrows stained by the ink of a fountain pen. It can now be appreciated that the melanin pigmentation follows exactly the lines created by the ink stain (ie, parallel furrow pattern).

Figure 2. Malignant melanoma of the left foot with a Breslow thickness of 0.55 mm. A, Clinical image. B, Dermoscopic findings show a parallel ridge pattern; however, some observers may find it difficult to identify the ridges. C, Dermoscopic findings of the melanoma in panel A after applying the furrow ink test. The furrows are now stained by the blue ink from a fountain pen; the pigmentation does not overlap with the stained furrows, corresponding to a parallel ridge pattern.
port: Marghoob. Study supervision: Braun and Marghoob. Financial Disclosure: None reported.

REFERENCES


Notable Notes

The Truly Paperless Dermatology Office

A time-honored tradition of running any medical office is the use of paper on examination tables. After each visit, whether or not bare skin has touched the examination table, a nurse will dutifully roll out fresh paper and discard the old. In our busy dermatology office, we began to question the wisdom of such a practice. In waiting rooms, patients sit on chairs with no covering. Yet when they sit on examination room tables with no direct skin contact, why must special care be taken? A review of the literature revealed no studies showing any decrease in infection rates with the use of paper.

Could paper actually be detrimental to office hygiene? We have noted occasions where paper was covering blood or other infectious material, and it is unclear whether the paper provides any real protection from transmission. We also noted that the paper does not even cover the entire table and that this practice leads to our trash cans overflowing before lunch. Finally, we considered the financial and environmental effects of paper. We were using, on average, 25 rolls of paper per month at a cost of $3.50 per roll, costing $1050 per year. Using 300 rolls per year was clearly not good for the environment.

With these thoughts in mind, we changed our office policy. No paper is to be used unless the patient requests it. If no bare skin touches the examination table, the table will not be cleaned. If there is direct skin contact, the table is wiped down with a bleach-based antiseptic towel. When we perform full-body skin examinations, patients are given a gown and instructed to undress except for underwear. We then adjust underwear as needed to perform a thorough examination. Keeping underwear on prevents the potential “sticky” situation of bare skin on examination table vinyl.

The larger question is, would patients accept the interruption in this long-held physician-patient agreement? We embarked on a 1-month experiment of a truly paperless office. To our surprise, we had a few questions but very few complaints. When patients were educated about our policy and assured that the tables had been properly cleaned, most of them were comfortable with the idea. A handful of patients asked for paper, and we accommodated them. We observed that unrolled paper connected to the back of the table prompted more complaints and questions. When paper was removed from the room, most patients did not seem to notice.

We have now changed to a fully paperless office. In doing so, we have helped the environment, decreased overhead, and saved nursing time, with no decrease in patient satisfaction. We consider our experiment a success and hope that other offices will consider such a change.

Kent Aftergut, MD
Contact Dr Aftergut at kentaftergut@yahoo.com