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REVIEW ARTICLE

Dermoscopy

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ABSTRACT

First, a brief introduction about types of dermoscope and an explanation on the theory of dermoscopy are provided. Second, some introduction on the difference of dermoscopic pictures between benign and malignant neoplasm is given. Basically, benign lesions tend to show symmetrical dermoscopic structures and colors, whereas malignant lesions have a tendency to present irregular and atypical dermoscopic structures. Third, the relationship between dermoscopic images and anatomical structures will be shown. Acral melanocytic lesions have site-specific dermoscopic patterns, namely parallel furrow pattern or parallel ridge pattern. These parallel patterns are due to different distribution of benign and malignant melanocytes. Benign melanocytes (nevus cells) are mainly found on the tips of crista profunda limitans and supply melanin granules to the furrows of stratum corneum, making a parallel furrow pattern. To the contrary, melanoma cells proliferate mainly on the tips of crista profunda intermedia or rather diffusely and randomly, and supply melanin granules irregularly and diffusely to the ridges of stratum corneum, having parallel ridge pattern. Fourth, the global features of dermoscopic findings are described respectively with definitions of the technical terms. To analyze dermoscopic structures, it is easier to look at global features first and local features next. Basic global features include reticular, globular, cobblestone, homogeneous, starburst and parallel patterns. If a given dermoscopy image has two patterns, the more prominent pattern might be chosen. If it has more than three dermoscopic patterns, then multi-component pattern is the reasonable selection. If there are no particular dermoscopic structures, then the unspecific pattern will be selected. Finally, some comments on the relationship between dermoscopy and dermatopathology are given briefly. It is always useful to imagine dermatopathological features when examining a dermoscopic image. There are considerable relations between dermoscopy and dermatopathology.

Key words: dermoscopy, melanoma, parallel pattern, pigmented skin lesions, reticular pattern.

INTRODUCTION

There is an increasing necessity of early detection of melanomas because of aging of the population and ozone hole above Antarctica. Dermoscopy is one of the beneficial tools for early detection of skin cancers, including melanoma and basal cell carcinoma. It is often difficult to distinguish early melanomas, basal cell carcinomas and nevi with the naked eyes. A dermoscope enables us to see clear distribution of superficial pigments and give us an idea of regular or irregular structures that are important features for the diagnosis of benign and malignant pigmented skin lesions. To provide an introduction to dermoscopy, I will show how it can be used to detect early malignant pigmented skin lesions, such as small melanoma *in situ* and very early basal cell carcinoma.

DERMOSCOPES

Dermoscopy is the procedure of using a dermoscope. There are many kinds of dermoscope and they are roughly divided into analogue and digital types. Delta 10 (Heine Optotechnik, Herrsching, Germany) and DermLite (3Gen, Dana Point, CA, USA) are dermoscopes used only for observation;

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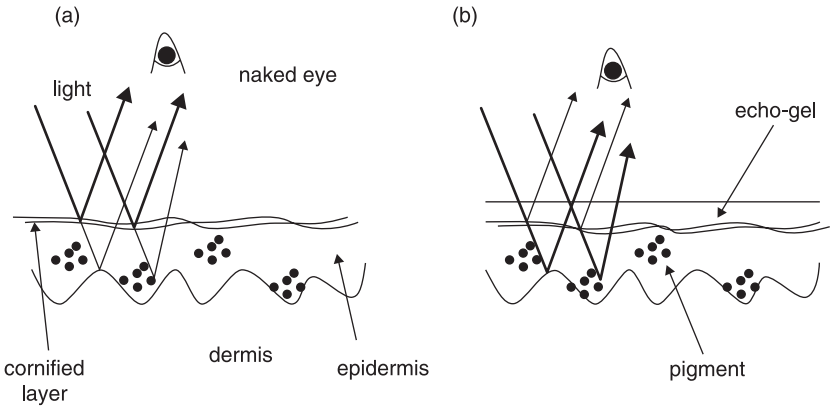

Figure 1. Theory of dermoscopy. The use of echo-gel on the cutaneous lesion makes the skin surface flat and optically homogeneous. Together with optimal lighting, it enables observation of pigment distribution in the skin.

Figure 2. Clinical picture of melanocytic nevus. Most nevi often appear to be featureless and show dark-brown pigmentation with the naked eye.

therefore, a digital camera is needed to connect with a Delta 20 (Heine), DermLiteFoto (3Gen) or Derma Watcher (Scalar, Tokyo, Japan) to store dermoscopic images. There is also a dermoscopy module connected with an ordinary single-lens reflex camera, DermaPhot (Heine), which produces the most in-focus photographs. However, the digital-type equipment is easier to use and the images easier to store as digital files, which can also be checked for quality in real-time clinical settings.

THEORY OF DERMOSCOPY

The theory is quite simple: if you try to see the bottom of a swimming pool when many people are bathing in it, you are not able to clearly see the bottom. This is because of random reflection on the water surface of the pool. To the contrary, if no one is swimming in the pool, you can clearly see the bottom and anything written upon it. In the same way, if you use echo-gel on the cutaneous lesion, the echo-gel makes the skin surface flat and optically homogeneous (Fig. 1). Thus, you can see through the horny layer and observe pigmentary or vascular distribution up to the upper dermis in the lesion.

DERMOSCOPY OF MELANOCYTIC NEVUS

Clinical pictures of melanocytic nevus are often featureless and show dark brown pigmentation (Fig. 2). Using dermoscopy, one can distinguish two typical patterns of melanocytic nevi: globular (Fig. 3) and reticular (Fig. 4). Other variations of pattern observed with nevi are cobblestone (papillomatous dermal nevus), starburst (Spitz nevus), parallel (acral nevus) and homogeneous blue pigmentation (blue nevus). However, if irregular distribution of any pattern is noted, malignant melanoma must be

Figure 3. Dermoscopic feature of a Clark nevus. This Clark nevus is composed of brown globules showing globular pattern as a global feature upon dermoscopy.

ruled out. Nevi with typical dermoscopy features but atypical clinical settings require biopsy or excision. We must always remember not make a diagnosis only on dermoscopy but on the clinical course of the lesion as well. Fundamentally, benign neoplasms show symmetrical dermoscopic patterns and malignant ones depict asymmetrical patterns.

RELATIONSHIP BETWEEN DERMOSCOPY AND ANATOMICAL STRUCTURES

It is especially important to know the anatomical structure of acral skin when considering dermoscopy of acral nevus and melanoma. Figure 5 shows the schematic structure of acral skin when it is cut perpendicular to the fingerprint. Fingerprints are due to furrows and ridges of stratum corneum. There are two kinds of epidermal rete ridges, one corresponding to the furrows and the other corresponding to the ridges. Nevus cells predominantly proliferate at the dermal–epidermal junction of crista limitans and supply melanin granules to the furrows, thus dermoscopy of nevi shows parallel furrow patterns most typically (Fig. 6). Melanoma cells, on the other hand, grow diffusely and individually at the junction, making diffuse and irregular pigmentation, interrupted by irregularly reflecting furrows and showing a parallel ridge pattern (Fig. 7).

Figure 4. Dermoscopic feature of a Clark nevus with reticular pattern. This Clark nevus is mainly composed of a thin, brown pigment network showing a reticular pattern as a global feature.

BASIC GLOBAL FEATURES OF DERMOSCOPY

In dermoscopic observation, global patterns are the first features of recognition and are subdivided into eight representative patterns and other unspecific patterns lying outside these categories. Reticular pattern is defined as a pattern with pigment network covering most parts. It consists of a grid of thin, brown lines over a diffuse light brown background. This pattern is most commonly observed in Clark nevi. Dermal nevi of the face (Miescher nevi) also shows a thick reticular pattern, but this is composed of pseudo network which is due to diffuse pigmentation with many hypopigmented small areas corresponding hair follicles. Globular pattern is a pattern with numerous, variously sized, round to oval structures with various shades of brown and gray-black coloration. This pattern is observed in Clark nevi

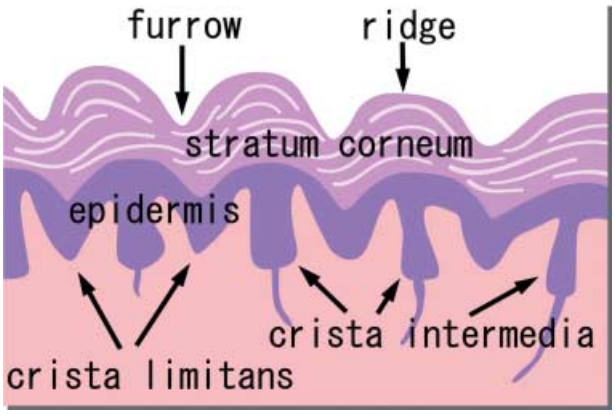

Figure 5. Anatomical structure of the acral skin. When acral skin is cut perpendicular to the fingerprints, two types of epidermal rete ridges, namely crista limitans and crista intermedia, are observed and they correspond to furrows and ridges, respectively. Dermal eccrine ducts are connecting to the crista intermedia and open to the center of the ridges.

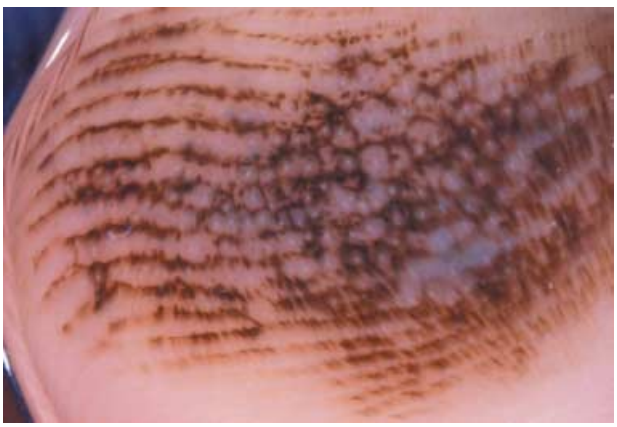

Figure 6. Typical acral congenital nevus showing parallel furrow pattern. Most acral nevi typically show a parallel furrow pattern and/or variant patterns, such as lattice-like pattern or fibrillar pattern.

with features of nesting proliferation of nevus cell at the dermal–epidermal junction. Spitz nevi at an early stage also present this pattern with larger globules at the periphery. Cobblestone pattern is a variation of globular pattern. This is a typical feature of papillomatous dermal nevi (Unna nevi), because when closely packed each papilla corresponds to the rather square shaped globules. Homogeneous pattern is a diffuse, brown, gray-blue to gray-black or reddish-black pigmentation in the absence of

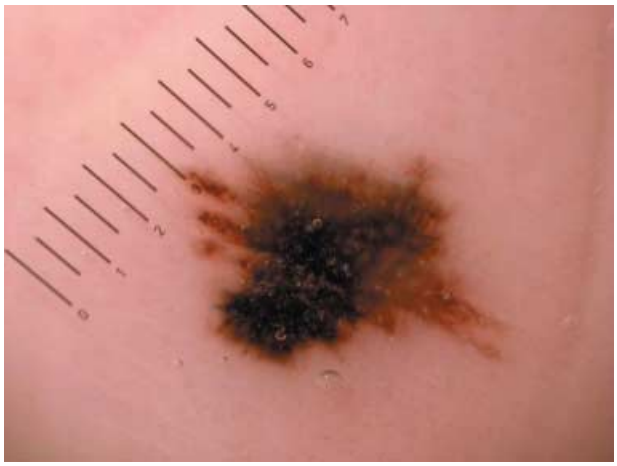

Figure 7. Acral lentiginous melanoma *in situ* showing parallel ridge pattern. Melanoma on acral skin basically shows irregular pigment distribution and parallel ridge pattern.

pigment network or other distinctive local features. This is a hallmark of blue nevi, but rarely presented in basal cell carcinoma, hemangioma or metastatic melanoma. Starburst pattern is a pattern with pigmented streaks in a radial arrangement at the edge. This pattern is a typical feature of a pigmented Spitz nevi (Reed nevi) at late stage. Parallel pattern is a pigmentation following the sulci superficiales, namely furrows, or a pigmentation aligned along the cristae superficiales, namely ridges. This is seen in acral nevi or melanoma. If a given dermoscopy image has two patterns, the more prominent pattern might be taken. Multicomponent pattern is a combination of the three or more patterns, meaning that there is a high possibility of malignant melanoma. Lacunar pattern is a pattern with several to numerous, smooth-bordered, round to oval, variously-sized structures called red lacunas. This pattern indicates that the lesion is hemangioma or subcorneal haematoma, such as black heel.

RELATIONSHIP BETWEEN DERMOSCOPY AND DERMATOPATHOLOGY

It is useful to consider dermatopathology when dermoscopy is used. There is a significant correlation between dermoscopic structures and dermatopathological findings. Multiple comedo-like openings corresponding to keratotic plugs and milia-like

cysts are equivalent to pseudo-horn cysts of seborrheic keratosis. It is interesting that the same keratinous material differs in color and shape because of the location of both features. The keratinous material is whitish in nature, but it turns brownish when it meets the air. This might be because of oxidization of sebum. Reddish lacunae are blood-containing cavities and their color becomes bluish when it in deeper dermis. Most of the basal cell carcinoma appears blue-gray because the nests of the tumor cells are situated in the dermis covered by normal epidermis that gives some whitish veil. A reddish background means the tumor is rich in vascular proliferation.