Dermoscopy of Pigmented Seborrheic Keratosis

A Morphological Study

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Objectives: To describe morphological features of seborrhoeic keratosis as seen by dermoscopy and to investigate their prevalence.

Design: Prospective cohort study using macrophotography and dermoscopy for the documentation of seborrheic keratosis.

Settings: Seborrheic keratoses were prospectively collected in 2 sites: a private practice in Plantation, Fla (site 1), and the Department of Dermatology at the University Hospital Geneva in Switzerland (site 2).

Patients: A total of 203 pigmented seborrheic keratoses (from 192 patients) with complete documentation were collected (111 from site 1 and 93 from site 2).

Interventions: Screening for new morphological features of seborrheic keratosis and evaluation of all lesions for the prevalence of these criteria.

Main Outcome Measures: Identification of new morphological criteria and evaluation of frequency.

Results: A total of 15 morphological dermoscopic criteria were identified. Standard criteria such as milialike cysts and comedolike openings were found in a high number of cases (135 and 144, respectively). We found network and networklike structures to be present in 94 lesions (46%). Using standard diagnostic criteria for seborrheic keratosis, 30 lesions would not have been diagnosed as such.

Conclusions: The classic dermoscopic criteria for seborrhoeic keratosis (milialike cysts and comedolike openings) have a high prevalence but the use of additional dermoscopic criteria such as fissures, hairpin blood vessels, sharp demarcation, and moth-eaten borders improves the diagnostic accuracy. The proper identification of pigment network and networklike structures is important for the correct diagnosis.

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In the past 2 decades, there has been a rising incidence of malignant melanoma. Due to a lack of adequate therapies for metastatic melanoma, the best treatment is still early diagnosis and prompt surgical excision of the primary cancer. Dermoscopy (also known as epiluminescence microscopy, dermoscopy, and skin-surface microscopy) is a simple, noninvasive, in vivo method that has been described as a useful tool for the early recognition of malignant melanoma. The performance of dermoscopy has been investigated by many authors. Its use increases diagnostic accuracy 5% to 30% over clinical visual inspection alone, depending on the type of skin lesions and experience of the physician. According to the guidelines of the Consensus NetMeeting on Dermoscopy, held in Rome in February 2001; see Web site at http://www.dermoscopy.org, the diagnostic strategy includes 2 different levels. In the first level, one must determine if a lesion is of melanocytic or nonmelanocytic origin. For this decision, an algorithm using morphological key criteria has been proposed. Once the lesion is identified to be of melanocytic origin, it must be categorized as benign, suspect, or malignant (second level). To accomplish this, 4 different approaches have been proposed: ABCD rule of dermoscopy, Menzies method, 7-point checklist, and pattern analysis. Diagnosis of seborrheic keratosis is, in general, a clinical diagnosis, but in a certain percentage of cases, differential diagnosis between pigmented seborrheic keratosis and malignant melanoma is difficult. The most common dermoscopic characteristics for seborrheic keratoses are comedolike openings and milialike cysts (Figure 1). Milialike cysts are round, whitish or yellowish structures that correspond to small intraepidermal, keratin-filled cysts.
They may also be seen in some congenital nevi and in some papillomatous melanocytic nevi. Comedolike openings (pseudofollicular openings, crypts) are mainly seen in seborrheic keratosis or papillomatous melanocytic nevi. Keratin-filled invaginations of the epidermis correspond histopathologically to comedolike structures.17,31-35

The purpose of this report was to review dermoscopic criteria of pigmented seborrheic keratosis, some of which have not been clearly defined in the literature.

METHODS

Two sources of clinical cases were used in this study. These sites were Skin and Cancer Associates, Plantation, Fla (site 1), and the Pigmented Skin Lesion Clinic, Department of Dermatology, University Hospital Geneva, Geneva, Switzerland (site 2).

All pigmented seborrheic keratoses were examined by experienced “dermoscopists” using a handheld dermoscope (Dermatoscope [Heine AG], Episcope [Welch-Allyn], or Dermogenius basic [Rodenstock Pražiossopitik]). All pigmented seborrheic keratoses data were collected prospectively (3 years at site 1 and 6 months at site 2). A macroscopic clinical photograph (Slue imaging system; Canfield Clinical Systems, Fairfield, NJ) and documentation of the dermoscopic finding (Dermaphot lens, Heine AG) was performed for every lesion. Since the diagnosis of pigmented seborrheic keratoses is usually clinical, we considered systematic biopsy (and histopathologic examination) as unethical, even though this might introduce a selection bias. Therefore, a biopsy was performed on patient request or in difficult cases (ie, melanocytic lesion could not be ruled out with certainty). All slides (clinical and dermoscopic), were reviewed by 2 physicians experienced in dermoscopy (R.P.B. and H.S.R.). During this first evaluation, both authors recorded all morphological findings to define more precisely the entity of seborrheic keratosis. In the second step, both authors reevaluated all lesions for presence or absence of the morphological features previously identified. For the descriptive statistics, the SPSS 9.0 software package (SPSS Inc, Chicago, Ill) was used.

RESULTS

A total of 203 pigmented seborrheic keratoses were collected (111 lesions from site 1 and 92 lesions from site 2). Histopathologic examination was performed in 99 lesions (89/2%) from site 1 and 85 lesions (91%) from site 2. In the first step (examination of both macroscopic and dermoscopic photographs of all lesions by both investigators), a total of 15 morphological dermoscopic criteria and 6 colors were identified (Table). The elementary lesion (patch, plaque, and papular/nodular) was identified on the clinical image. The reticulated type of seborrheic keratosis was mainly found in patch lesions and the acanthotic type was mainly found in thicker lesions (plaque and papular/nodular).

In the second step, all lesions were evaluated for the presence or absence of the morphological criteria identified in the first step. The frequencies of the criteria are shown in the Table. We found 28 lesions of the face while 175...
lesions were located elsewhere. Elementary lesions were distributed as follows: 39 patch lesions (19%), 101 plaque lesions (50%), and 63 papular/nodular lesions (31%). Hairpin vessels were found in 129 lesions (63%). They were mainly found in thicker lesions (94% plaque or papular/nodular lesions). Of the 203 seborrheic keratoses, 183 lesions were sharply demarcated (90%).

Comedolike openings were found in 144 lesions (71%) (Figure 1 and Figure 2) and 91% of the lesions with comedolike openings were plaque or papular/nodular lesions. Milialike cysts (Figures 1 and 2) were found in 135 lesions (66%) and 86% of them were either plaque or papular/nodular lesions. The number of milialike cysts ranged from 1 to 184, with a mean of 13 (median, 4).

Lesions were light brown in 191 (94%) and dark brown in 193 (95%). Blue-gray was present in 108 (53%) lesions (57% of the lesions from site 1 and 43% from site 2).

Network (Figure 2) was found in 94 lesions (46%): prominent network in 66 lesions (32%), thickened network in 58 (28%), and heterogenic network in 61 lesions (30%). An exophytic papillary structure was found in 8% of the seborrheic keratoses (75% in plaque and 25% papular/nodular lesions).36 Fissures (Figure 3) were found in 124 lesions (61%): 12 (10%) of them were patch lesions, 69 were plaque lesions (56%), and 43 (35%) were papular/nodular lesions. A total of 90% of lesions with fissures were thicker lesions (plaque or papular/nodular).

A moth-eaten border (Figure 2) was found in 94 lesions (46%): 31 patch lesions (33%), 44 plaque lesions (47%), and 19 papular/nodular lesions (20%). By definition, a “moth-eaten” border is sharply demarcated, but not all sharply demarcated lesions have a moth-eaten border.

**COMMENT**

There are many publications on the differential diagnosis of pigmented skin lesions. According to the proposal by the Board of the Consensus NetMeeting on Dermoscopy, 2 decisions on different levels have to be made: the first decision (level I) is whether the lesion is of melanocytic or nonmelanocytic origin.27

Once the lesion is identified as melanocytic, it is further classified as benign, suspect, or malignant (level II decision). For seborrheic keratosis, the first level decision (melanocytic vs nonmelanocytic) is the most important. If a seborrheic keratosis is considered to be a melanocytic lesion, the lesion might be classified as malignant in many cases.

One of the key criterion of the algorithm is the presence of pigment network in the first step of the algorithm. The term “pigment network” corresponds to the thin, gridlike network consisting of pigmented “lines” and hypopigmented “holes” and should be reserved for melanocytic lesions.17,32-35 The anatomical basis of the latter is melanin pigment in keratinocytes or in melanocytes along the dermoepidermal junction. The reticulation (network) represents the rete ridge pattern of the epidermis. The relatively hypomelanotic holes in the network correspond to tips of the dermal papillae and the underlying...
suprapapillary plates of the epidermis. In our series, 94 lesions (46%) had a network and thus would be classified as melanocytic lesions in the level I decision, and in the level II decision (benign vs suspect vs malignant), some would have been classified as malignant or "suspect."

By reviewing all seborrheic keratoses where “network” was rated positive, we realized that this structure did not correspond to the classic “pigment network” of melanocytic lesions (as described above) but resembled them. Therefore, we proposed the term “networklike structures” (Figure 2). The lines of these structures are often hyperpigmented and may end abruptly at the periphery. The grids of these “networklike structures” are much larger than the one seen in a typical pigment network and the holes do not always correspond to the tips of the dermal papillae, but to keratin-filled structures (fissures, comedolike openings). We found these networklike structures in 46% of all lesions in our study. This high percentage might be because we focused on pigmented seborrheic keratosis and therefore might have introduced a selection bias.

Another type of “network” that may be seen in a solar lentigo or an early seborrheic keratosis is “finger-printing.” These are networks that are light brown and delicate, and have a fingerprint pattern.

Even if one ignores the first step of the algorithm (evaluation for the presence of pigment network, branched streaks, or aggregated globules), the second step is also a potential source for misclassification. In the initial algorithm proposed by Stolz et al, the morphological criteria for the identification of seborrheic keratosis (step 2) were comedolike openings and milialike cysts. A total of 30 lesions (15%) did not have either criteria and would not have been identified as seborrheic keratosis. By using the additional criteria presented at the Consensus NetMeeting, misclassification can be reduced. The use of fissures (brainlike appearance) reduces the number of misclassified cases to 22 and the additional use of fingerprinting to 14.

Apart from the classic criteria, 4 of the 15 morphological criteria for pigmented seborrheic keratosis seemed to be helpful for the diagnosis: fissures, hairpin blood vessels (clustered or grapelike), sharp demarcation, and moth-eaten border. If these 4 criteria had been added to the standard criteria, none of the lesions would have been misclassified. Since we did not test our diagnostic criteria in a set of randomly chosen pigmented skin lesions, we are not able to determine the specificity of our criteria. If one uses the algorithm for the differential diagnosis of pigmented skin lesions, the use of these additional criteria reduces the number of lesions that would have been misclassified and therefore increases the diagnostic performance of the algorithm.

Hairpin blood vessels were found in 129 (63%) of the pigmented seborrheic keratoses (Figure 4). According to Kreusch and Koch, they correspond to long capillary loops, commonly seen in keratinizing tumors, and are mainly found at the border or in the periphery of the lesions. In most of the cases, clusters of blood vessels are grouped together and each of them has a whitish halo that gives them almost a “grapelike” appearance. This typical vascular architecture is predominantly seen in seborrheic keratosis.

Fissures are irregular linear, keratin-filled depressions that can be seen in seborrheic keratosis. However, they may be seen also in nevi with congenital patterns and sometimes in common melanocytic nevi. The presence of multiple fissures might give a "brainlike" appearance to the lesion (Figure 3).

The term “moth-eaten border” (Figure 2) has been introduced by Menzies et al and according to Schiffter et al is also seen in solar lentigines. Since we considered systematic biopsy of all seborrheic keratoses to be unethical, it was therefore performed on patient request or in cases where a doubt concerning the differential diagnosis remained (difficult cases). Even though we made this limitation, histopathological examination was performed in more than 90% of the lesions because most of the patients wanted the keratoses to be removed even though they were informed about its benign nature (90% of the lesions that underwent biopsy). Only a minority (10%) of the cases underwent biopsy because of a diagnostic doubt and can therefore be considered as difficult lesions. This procedure does not really introduce a selection bias because all pigmented seborrheic keratoses were included in this study but not all of them underwent biopsy.

We conclude that milialike cysts and comedolike openings are excellent diagnostic criteria for the identification of the majority of seborrheic keratoses, but that the use of other criteria (fissures, hairpin blood vessels, sharp demarcation, and moth-eaten border) decrease the risk of misclassification of pigmented seborrheic keratosis and has the potential to improve the diagnostic accu-
racy of such (especially in difficult cases). Networklike structures may also be seen in seborrheic keratoses. They have to be identified as such and should not be confused with the typical pigment network as seen in melanocytic lesions. Otherwise, seborrheic keratoses could be misclassified as melanocytic lesions.

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