Correlation between digital epiluminescence microscopy parameters and histopathological changes in lentigo maligna and solar lentigo: A dermoscopic index for the diagnosis of lentigo maligna

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Background: The clinical and dermoscopic differentiation between lentigo maligna (LM) and solar lentigo (SL)/initial seborrheic keratosis (SK) may be difficult.

Objective: Our aim was to identify digital epiluminescence microscopy (DELM)-specific criteria that can be helpful in distinguishing LM from SL/SK and to propose a new model of LM dermoscopic progression based on a study of DELM-histopathological correlation.

Methods: A total of 167 consecutive doubtful pigmented lesions of the head (105 LM and 62 SL/SK) were studied. DELM assessment was based on the presence or absence of 15 DELM parameters that were subsequently examined histologically. Statistical analysis was performed to determine which DELM parameters were most strongly associated with LM.

Results: The finding of at least 1 of 4 parameters (ie, brown globules, a "necklace" pigment network, an atypical pigment network, and dark-brown/blue-gray ribbonlike structures) showed to be an extremely sensitive (99%) and specific (83.9%) DELM criterion to discriminate between LM and SL/SK.

Limitations: Our findings were obtained by examining medium-high magnification DELM images.

Conclusions: The finding of 1 or more among the 4 above-mentioned DELM parameters allows for the correct identification of 99.0% of the LM lesions, and - when the score is 0 - the correct classification as non-LM, of 83.9% of the SL/SK lesions. (J Am Acad Dermatol 2017;76:234-43.)

Key words: dermoscopy; diagnostic index; digital epiluminescence microscopy; histology; lentigo maligna; sensitivity and specificity; solar lentigo/seborrheic keratosis.

The clinical differentiation between in situ melanoma of the head (lentigo maligna [LM]) and solar lentigo (SL)/initial seborrheic keratosis (SK) can be difficult. At times, SL/SK may present itself with an asymmetric shape, irregular borders, color variegation, and a diameter larger than

Abbreviations used:

DELM:	digital epiluminescence microscopy
LM:	lentigo maligna
SK:	seborrheic keratosis
SL:	solar lentigo

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5 mm thereby fulfilling all clinical criteria for melanoma. Previous studies have proposed a number of specific dermoscopic parameters and patterns that may be helpful in distinguishing LM from SL/SK.[1-9]

In this study, we first examined the digital epiluminescence microscopy (DELM) features in a series of equivocal pigmented lesions of the head with the aim of identifying specific criteria that may be useful in differentiating LM from SL/SK. Then, most DELM parameters underwent histologic evaluation; rigorous analysis of the correlation between histopathological and DELM findings allowed us to postulate a new model of LM dermoscopic progression.

In this study, the terms "digital epiluminescence microscopy" and "dermoscopy" are used as synonyms.

CAPSULE SUMMARY

- The differentiation between lentigo maligna and solar lentigo/initial seborrheic keratosis may be difficult.
- Brown globules, "necklace" pigment network, atypical pigment network, and dark-brown/blue-gray ribbonlike structures are specific digital epiluminescence microscopy parameters for lentigo maligna.
- The finding of 1 or more among these parameters can allow for correct identification of 99% of cases of lentigo maligna.

METHODS

We selected a series of 176 consecutive doubtful pigmented lesions of the face and scalp from January 2008 to December 2014 in our dermoscopy unit. The study was approved by the ethical committee of Istituto Dermopatico dell'Immacolata IRCCS-FLMM. Clinically, all lesions were larger than 5 mm in diameter, with a flat surface, irregular margins, and color variegation (at least 2 shades of brown were simultaneously present in each lesion).

Good-quality clinical and DELM images were taken of each lesion with a Leica Wild M-650 microscope (Leica AG, Heerbrugg, Switzerland) and DBDERMO MIPS software (Dell'Eva/Burroni Studio, Florence/Siena, Italy) DELM evaluation was based on the presence or absence (images obtained at medium-high magnification) of 15 parameters according to the working definitions summarized in Table I. The presence or absence of DELM parameters in a lesion were agreed on by 2 DELM-experienced dermatologists. After DELM assessment, all lesions were excised and processed for routine histopathological examination.

Histopathological study

In all, 81 examples of 13 different DELM parameters (6 light-/dark-brown pseudonetwork, 3 blue-gray pseudonetwork, 8 brown globules, 10 thin brown pigment network, 10 "necklace" pigment network, 10 atypical pigment network, 6 blue-gray dots/small globules, 10 dark-brown/blue-gray ribbonlike structures, 3 symmetric pigmentation of follicular ostia, 3 asymmetric pigmentation of follicular ostia, 4 black structures, 3 diffuse opaque yellow-brown pigmentation, and 5 brown cerebriform structures) were randomly selected for DELM-histopathological correlation. A line was drawn with computer software across each image of the selected DELM parameter. The exact same line was then reproduced with a similar technique on the clinical image of the corresponding lesion. Both DELM and clinical images were then printed in color. Immediately after excision, the sides of each specimen were marked with suture stitches to maintain orientation. In the laboratory of dermatopathology, the point of each specimen corresponding to the selected DELM parameter was dotted with Alcian blue stain and grossly cut following the line drawn on the clinical and DELM printed images. Finally, step-sectioned blocks were cut at 4 μm with a microtome, and the resulting sections were stained with hematoxylin and eosin.

Statistical analysis

Each DELM parameter was coded as present/absent. The proportion of lesions with a "present" parameter was computed for patients with LM and SL/SK. Fisher exact test was used, because of the small numerators observed for several parameters.

To select the parameters that provide more information in separating LM from SL/SK we proceeded empirically by choosing several combinations of the parameters with the highest statistical significance in the bivariate analysis and then computing summary scores for each lesion by adding 1 point for each "present" parameter in the different combinations.

Such scores were then cross-tabulated with the 2 study conditions. Cut-offs for the identification of LM were computed for the different combinations of parameters on the basis of receiver operating characteristic curves, designating the histopathological diagnosis of LM as outcome measure. Using the receiver operating characteristic curve, we plotted sensitivity versus 1 − specificity for the scores of each combination, and the ideal cut-off was indicated by the point in the curve closest to the upper left corner of the diagram.[10] All analyses were performed using