The Ringlike Pattern in Vulvar Melanosis

A New Dermoscopic Clue for Diagnosis

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Background: Vulvar melanosis is a benign pigmented lesion that may clinically mimic melanoma. Whereas the dermoscopic features of other pigmented skin lesions have been extensively described, little is known about vulvar melanosis.

Observations: A retrospective dermoscopic study was conducted on 87 lesions with histopathologically proved melanosis. We describe and define, for the first time to our knowledge, a ringlike pattern, found in 28 of 87 melanotic macules, which usually takes the shape of multiple flat asymmetrical macules, with a tan-brown to blue-black color, irregular borders, and variable size. In most cases, it develops on the labia minora, but it can also occur on the labia majora, perineum, introitus, vagina, and cervix.

Although VM is a benign lesion, its correlation with mucosal melanoma is still under debate. It often poses a diagnostic challenge because it shows many clinical features consistent with those of melanoma. In such cases, biopsy and histopathologic examination are necessary to define a correct diagnosis.

The improved accuracy of dermoscopy in diagnosing pigmented skin lesions has been widely demonstrated. Despite this, the role of dermoscopy in the diagnosis of mucosal pigmented lesions has been investigated in few studies. The structureless and parallel patterns have been described as the most frequent dermoscopic findings of melanosis with a vulvar location. Other dermoscopic patterns, such as cobblestonelike and reticulonely like, have occasionally been reported at this same site and on the lip, respectively. The aims of this study are to describe the dermoscopic patterns of VM in a database of pigmented lesions and to investigate the age of the patients, the clinical appearance as a single or multifocal macule, and the distribution of the lesions in specific sites of the vulvar region for each pattern.

Conclusion: Dermoscopy can be useful for the clinical detection of vulvar melanosis, and the ringlike pattern may represent a new dermoscopic clue for the diagnosis of this lesion.

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METHODS

We performed a multidisciplinary, retrospective, dermoscopic study of histopathologically proved pigmented vulvar lesions collected at the Melanoma Unit of Santa Maria and San Gallicano Dermatological Institute between January 1, 2004, and December 31, 2006, and selected after a gynecologic visit to Regina Elena National Cancer Institute. The computerized digital imaging system consisted of a videodermoscope with a fiberoptic probe connected to a video terminal with 2 magnification lenses (×20 and ×50) and a 17-in Pentium IV personal computer (Videocap 200; DS-Mediagroup, Milan, Italy). The dedicated software allows the storage of clinical and dermoscopic digital images of the lesions and access to the patient’s database for entering personal information and data concerning the patient’s own history of melanoma and nonmelanoma skin cancers and that of his or her family. This technique allows evaluation of the lesion’s border and its minimum and maximum diameters; in this way, it is possible to calculate its area and its circumference. All the lesions were ob-
served by 3 independent dermatologists (A.F., P.B., and C.C.), experts in dermoscopy, for the evaluation of the lesion’s dermoscopic aspect; a specific pattern was considered present when 2 of the 3 observers agreed. The age of the patient, the clinical appearance as a single or multifocal lesion, and localization at a specific vulvar site were investigated for each pattern. A 4- to 6-mm punch biopsy was performed for lesions larger than 1 cm in diameter, whereas in the case of multiple lesions, the most suspect among them was treated by means of full surgical removal.

Descriptive statistics were used to summarize the information yielded by the study. The association between variables was tested using the Pearson \( \chi^2 \) test or the Fisher exact test. Multiple correspondence analysis, a descriptive/exploratory technique designed to analyze simple 2-way and multiway tables, was used to identify clinical and dermoscopic profiles. The results provide information similar to that yielded by factor analysis techniques, which allow exploration of the structure of the categorical variables included in the table. The most common table of this type is the 2-way frequency cross-tabulation table. This representation aims to simultaneously visualize the similarities and differences of profiles, identifying the dimensions whose data show greater variability. The position of the points in the multiple correspondence analysis graph is informative. Categories that plot close to each other are statistically related and have patterns of relative frequencies. This association is statistically reliable (using the Lebart statistic) when the points are located far from the origin of the graph, which represents a mean, uninformative profile. A statistical software program (SPSS version 11.0; SPSS Inc, Chicago, Illinois) was used.

RESULTS

Of 115 white patients with pigmented vulvar lesions, 71 (median age, 41 years; age range, 22-78 years) showed 87 histopathologically proved melanotic spots. The vulvar sites involved were the labia minora in 44 of 71 patients (62%), the labia majora in 18 (25%), and the labia minora and the labia majora simultaneously in 9 (13%). At clinical examination, melanosis appeared as a multifocal lesion in 43 of 71 patients (61%) and as a single macule in 28 (39%), with homogeneous pigmentation in 43 (61%) and irregular pigmentation variable from brown to black in 28 (39%) (Table 1).

At dermoscopic analysis, 6 different patterns were observed, alone in 60 of 87 lesions (69%) and combined in 27 of 87 lesions (31%). In 28 of 87 lesions (32%), we observed a ringlike pattern characterized by multiple round to oval structures, white to light brown, with hyperpigmented well-defined regular borders arranged in a grape-like manner in some areas (Figure 1). It was found as a single pattern in 21 of 28 lesions (75%) and combined with other patterns in 7 (25%). A structureless pattern characterized by diffuse homogeneous or variegated brown to gray-blue pigmentation—in the absence of typical dermoscopic criteria for melanocytic lesions, such as dots and globules, pigment network, and streaks—was observed in 18 of 87 lesions (21%) (Figure 2A). A globularlike pattern showing aggregated round to oval structures, tan to dark brown, similar to globules of melanocytic lesions, was also found in 18 of 87 melanotic spots (21%) (Figure 2B). The structureless and globularlike patterns were observed alone in 10 of 18 melanotic spots (56%) and combined with other patterns in 8 (44%).

A parallel pattern, which appeared as linear or curved streaks running parallel to the skin surface, was observed in 15 of 87 lesions (17%) (Figure 3A). This pattern was found alone in 9 of 15 lesions (60%) and combined with other patterns in 6 (40%). The cobblestone-like pattern, featuring aggregated tan to dark brown polygonal structures, was observed only as a single pattern in 4 of 87 lesions (5%) (Figure 3B). The reticularlike pattern, found in 4 of 87 lesions (5%), appeared similar to the pigment network displayed by melanocytic lesions, from which it differed in the oval or round shape (not polygonal) of the meshes. This pattern was characterized by a regular distribution of the grids and meshes and by the abrupt ending of the lines all along the border of the lesion (Figure 3C). It was found combined with other patterns in 2 of 4 lesions (50%).

A multifocal aspect was observed in 23 of 28 melanotic spots (82%) featuring a ringlike pattern, in 7 of 18 (39%) with a structureless pattern, in 10 of 18 (56%) showing a globularlike pattern, in 7 of 15 (47%) with a parallel pattern, in 4 of 4 (100%) with a cobblestone-like pattern, and in 3 of 4 (75%) with a reticularlike pattern. A significant association between the distribution of multifocal lesions featuring ringlike and nonringlike patterns was found (82% vs 52%; \( P = .008 \)). No significant association with a specific site (labia minora vs labia majora) at the vulvar region (\( P = .55 \)) or with the patient’s age (\( P = .50 \)) was observed (Table 2).

The interrelationship of each examined dermoscopic pattern, the patient’s age, the clinical appearance of the lesion, and a specific vulvar site was evaluated by using multiple correspondence analysis (Figure 4). This analysis allows a visual illustration of the associations among the evaluated variables. Values of absolute and relative contributions produced by statistical analysis (the Lebart statistic) showed, along the first axis, a contrast between 2 groups. One group (C) was characterized by a stronger association between the ringlike, cobblestone-like, and reticularlike patterns and the multifocal aspect and by a weaker association of the previously mentioned patterns with a specific vulvar site; the other group (B), which is complementary to C, included parallel, structureless, and globularlike patterns as dermoscopic features that shared a clinical appearance as a single lesion. In this group, the dermoscopic patterns were not associated with the anatomical site. No association was ob-

### Table 1. Characteristics of 71 Patients With Melanotic Lesions

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, median (range), y</td>
<td>41 (22-78)</td>
</tr>
<tr>
<td>Clinical appearance</td>
<td></td>
</tr>
<tr>
<td>Single macule</td>
<td>28 (39)</td>
</tr>
<tr>
<td>Multifocal macule</td>
<td>43 (61)</td>
</tr>
<tr>
<td>Vulvar site</td>
<td></td>
</tr>
<tr>
<td>Labia majora</td>
<td>18 (25)</td>
</tr>
<tr>
<td>Labia minora</td>
<td>44 (62)</td>
</tr>
<tr>
<td>Labia majora and labia minora</td>
<td>9 (13)</td>
</tr>
<tr>
<td>Pigmentation</td>
<td></td>
</tr>
<tr>
<td>Homogeneous</td>
<td>43 (61)</td>
</tr>
<tr>
<td>Nonhomogeneous</td>
<td>28 (39)</td>
</tr>
</tbody>
</table>

aData are given as number (percentage) of patients unless otherwise indicated.

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served between the different patterns and the age of the patients (A and D).

On histopathologic examination, all the lesions observed showed variable distribution of the melanin pigment along the epidermal basal layer and several melanophages in the dermis from normal to slightly increased, with no increase in the number of melanocytes. The histopathologic findings of the ringlike and parallel patterns were similar: both were characterized by moderate to marked hyperpigmentation of elongated and clubbed rete ridges along the basal epidermal layer. The ringlike pattern differed in there being “skip” areas of pigmentation present at the top of the dermal papillae; the parallel pattern differed in there being more pronounced melanin pigment at the tip of the rete ridges, in the absence of the previously mentioned skip areas (Figure 5).

Recently, dermoscopy has proved to be a useful tool for improving accuracy in diagnosing VM by disclosing some features not visible to the naked eye.14,15,17 Mannone et al14 previously reported the structureless pattern as the dermoscopic hallmark of VM, especially in the case of clinically equivocal lesions with a large diameter.

Instead, the most frequent pattern that we described, and defined for the first time to our knowledge, was the ringlike pattern. It was characterized by multiple round to oval structures, white to light brown, with hyperpigmented well-defined regular borders, arranged in a grapelike manner in some areas (A and B). In A, the inset is a clinical image showing a multifocal melanosis characterized by irregular multiple black spots localized at the internal side of the labia minora pudendi of a 43-year-old woman. In B, the inset is a clinical image displaying a multifocal melanosis characterized by a large black macule with an irregular border localized at the internal side of the left labium minus pudendi, and smaller spots at the clitoris and at the fourchette of a 66-year-old patient.
The structureless and globularlike patterns were observed in the same percentage of lesions. The first pattern, as reported by other researchers, was characterized by a diffuse dark brown to blue-gray pigmentation, whereas the second pattern featured aggregated structures, round to oval and tan to dark brown. Neither of them could rule out the diagnosis of melanocytic lesion. In addition, the blue-gray pigmentation, featuring the first pattern, increased the suspicion index because, in dermoscopy, the blue hue is known to be related to malignancy.\textsuperscript{15,18,19} The parallel pattern, observed in VM and in labial melanosis by Argenziano et al\textsuperscript{15} and in clinically typical, small melanotic macules of the lip and of the penis by Mannone et al,\textsuperscript{14} may be considered typical of melanosis, although it is commonly found in melanocytic lesions at specific anatomical sites (ie, the palms and soles).

![Figure 3. Dermoscopy of melanotic lesions showing a parallel pattern with curved streaks that run parallel to the skin surface (A), a cobblestonelike pattern featuring aggregated brown polygonal structures (B), and a reticularlike pattern featuring oval meshes and abrupt ending of the lines at the borders (C). In A, the inset is a clinical image showing multiple black spots at the external side of the left labium minus pudendi of a 41-year-old woman. In B, the inset shows diffuse gray to black pigmentation that can be clinically seen at the labia minora pudendi of a 27-year-old woman. In C, the inset is a clinical image showing an asymmetric single dark brown to black macule at the left labium minus pudendi of a 30-year-old patient.](image)

![Figure 4. Multiple correspondence analysis showing the associations among dermoscopic pattern, patient age, clinical appearance of the lesion, and specific vulvar site. A and D indicate the groups in which no association was observed between the different patterns and the age of the patients; B, which is complementary to C, the group with parallel, structureless, and globularlike patterns as dermoscopic features that shared a clinical appearance as a single lesion (in this group, the dermoscopic patterns were not associated with the anatomical site); and C, the group characterized by a stronger association between the ringlike, cobblestonelike, and reticularlike patterns and the multifocal aspect, and by a weaker association of the previously mentioned patterns with a specific vulvar site. The numbers on the axes represent a score indicating the contribution of each factor (or variable) to overall variability.](image)

![Table 2. Lesion Characteristics and Patient Age in the Ringlike and Nonringlike Patterns](table)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ringlike Pattern</th>
<th>Nonringlike Pattern</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical appearance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single lesion</td>
<td>5 (18)</td>
<td>28 (47)</td>
<td>.008</td>
</tr>
<tr>
<td>Multinodal lesion</td>
<td>23 (82)</td>
<td>31 (53)</td>
<td></td>
</tr>
<tr>
<td>Vulvar site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labia majora pudendi</td>
<td>5 (18)</td>
<td>14 (24)</td>
<td>.55</td>
</tr>
<tr>
<td>Labia minora pudendi</td>
<td>18 (64)</td>
<td>39 (66)</td>
<td></td>
</tr>
<tr>
<td>Labia majora pudendi and labia minora pudendi</td>
<td>5 (18)</td>
<td>6 (10)</td>
<td></td>
</tr>
<tr>
<td>Patient age, y\textsuperscript{a}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤41</td>
<td>12 (55)</td>
<td>22 (46)</td>
<td>.50</td>
</tr>
<tr>
<td>&gt;41</td>
<td>10 (45)</td>
<td>26 (54)</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a}Data are missing for 1 patient.

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The cobblestonelike and reticularlike patterns were seldom observed; they featured brown polygonal structures larger than globules and pigment network, respectively, which are common findings in melanocytic lesions. Compared with melanocytic lesions, the shape of the meshes of the pigment network in the reticularlike pattern was either round or oval (not polygonal), and, unlike the atypical pigment network of melanoma, in VM, the grids and the meshes were more regularly distributed. However, in all these lesions, a punch biopsy is strongly recommended to confirm the diagnosis. In contrast to the present results, Mannone et al. found a reticularlike pattern combined with melanosis of the areola and, rarely, of the lip.

By statistical analysis, the clinical appearance of the lesions as single or multifocal macules was the most discriminant factor in the different dermoscopic patterns, which were not strongly related to a specific vulvar site and had no association with the patient's age. Melanotic lesions featuring the ringlike, cobblestonelike, and reticularlike patterns most frequently appeared as multifocal macules located at the labia majora and labia minora; lesions featuring the globularlike, structureless, and parallel patterns most commonly developed as single lesions and were not associated with a specific vulvar site. In conclusion, dermoscopy can be a useful aid for the clinical detection of VM, especially when it appears as a single macule, and can represent a tool to strengthen the suspicion of melanosis when it occurs in the shape of multifocal macules, which is the most frequent clinical presentation of melanosis. The ringlike pattern, the one most frequently observed in multifocal macules in this series, which we defined for the first time to our knowledge, may represent a new dermoscopic clue for the diagnosis of VM. However, we suggest not considering the ringlike pattern to be predictive until a more in-depth study, with a strong histopathologic correlation with dermoscopic features, is performed. In addition, we underline the importance of a multidisciplinary approach to VM by dermatologists and gynecologists, and we also suggest that a punch biopsy be performed in all doubtful lesions to rule out the diagnosis of melanoma.

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Author Contributions: Dr Ferrari had full access to all of 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: Ferrari and Catricalà. Acquisition of data: Bucciari, Covello, De Simone, Siliro, G. Mariani, Eibenschutz, and L. Mariani. Drafting of the manuscript: Ferrari. Catricalà, De Simone, Siliro, G. Mariani, Eibenschutz, and L. Mariani. Critical revision of the manuscript for important intellectual content: Bucciari and Catricalà. Administrative, technical, or material support: Covello, G. Mariani, and L. Mariani. Study supervision: Catricalà.

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REFERENCES