Objective: To investigate the dermoscopic features of acral melanocytic lesions in a white population in central Italy.

Design: Retrospective review.

Setting: University dermatology department.

Patients: Six hundred fifty-one Italian subjects, ranging in age from 6 months to 78 years.

Main Outcome Measures: We retrospectively investigated all digital dermoscopic images of acral melanocytic lesions included in our database from January 1996 to May 2005.

Results: We retrieved digital images of 723 benign acral melanocytic lesions in 641 patients (235 males and 406 females; mean age, 26.5 years) and of 10 acral melanomas in 10 patients (7 males and 3 females; mean age, 65 years). Individual lesions were located on the soles (n=520), fingers (n=146), and palms (n=67). Among acral nevi, the parallel furrow (42.1%) was the most common pattern, followed by the latticelike (14.9%), nontypical (13.7%), fibrillar (10.8%), homogeneous (9.3%), globular (5.4%), and reticular (2.1%) patterns. The frequency of distribution of the latticelike, nontypical, fibrillar, and homogeneous patterns significantly differed ($P<.001$, $P=.03$, $P<.001$, and $P=.03$, respectively) between anatomical sites. Also, 13 acral nevi (1.8%), mainly located on the fingers, showed a new combined pattern (transition pattern) consisting of a brownish black network associated with a parallel furrow or latticelike pattern. All 10 acral melanomas showed a multicomponent dermoscopic pattern.

Conclusions: In our series of acral nevi, we observed 8 dermoscopic patterns, with varying distribution by anatomical site. Identification of a specific pattern is highly suggestive of the benign or the malignant nature of any given acral melanocytic lesion.

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Benign Melanocytic Lesions on acral sites, which are common in all populations, may be difficult to differentiate clinically from early acral melanoma.1-3 For this reason, Saida et al4 recommended surgical excision of any acquired melanocytic lesion larger than 7 mm in diameter on the volar skin. Dermoscopy is a noninvasive technique that enables clinicians to differentiate nevi from melanomas in the early stage.5-7 Specific dermoscopic patterns of nevi and melanomas located on the palms and soles were initially described in Japanese studies showing that dermoscopic examination can increase accuracy in the diagnosis of pigmented acral melanocytic skin lesions.8-12 Acrual melanoma was described as having a multicomponent dermoscopic pattern, characterized by the following features: parallel ridge pattern, irregular diffuse pigmentation, abrupt edges, serrated pattern, peripheral irregular dots and globules, and/or blue-white veil.9-12 The presence of the parallel ridge pattern, in which pigmentation is seen on the ridges of the skin markings, was associated with acral melanoma in situ, and the presence of irregular diffuse pigmentation was considered highly suggestive of invasive acral melanoma.9-12

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By contrast, 4 distinctive dermoscopic patterns were described for acral melanocytic nevi: (1) the parallel furrow pattern, in which pigmentation is seen on the parallel sulci of the skin markings (variants of this pattern are the globular subtype and the double-lined subtype); (2) the latticelike pattern, which is characterized by pigmented lines that follow and
cross the skin markings; (3) the fibrillar pattern, in which pigmented lines cross the skin markings diagonally; and (4) the nontypical pattern, which is characterized by dermoscopic features that do not conform to any of the other typical patterns and cannot be classified as the multi-component pattern.

Malvehy and Puig recently described 3 additional dermoscopic patterns of acral nevi in patients with atypical mole syndrome: (1) the globular pattern, in which brown globules are regularly distributed within the lesion; (2) the homogeneous pattern, which is distinguished by diffuse light-brown or blue pigmentation; and (3) the reticular pattern, which is characterized by a black/brown network similar to that observed in melanocytic lesions that are located on nonglabrous skin.

The distinctive features of the major acral dermoscopic patterns demonstrate the utility of dermoscopy in differentiating benign acral melanocytic lesions from acral melanomas. However, most of the dermoscopic studies to date have described acral lesions in Asian populations. Few data have been published regarding dermoscopic examination of nevi on glabrous skin of white subjects. The objectives of our study were (1) to describe the dermoscopic features of acral melanocytic nevi and melanomas in a white population in central Italy and (2) to analyze the distribution of lesions in 3 anatomical sites on acral volar skin based on the dermoscopic patterns described herein.

METHODS

We retrospectively investigated all dermoscopic images of acral melanocytic lesions that were collected at the outpatient clinic of the Department of Dermatology, University of L’Aquila, L’Aquila, Italy, and included in our digital database from January 1996, when digital dermoscopy was introduced in our department, to May 2005. The catchment area for our clinic consists of 4 administrative provinces of central Italy (L’Aquila, Teramo, Frosinone, and Rieti). Demographic data such as age, sex, Fitzpatrick skin type, and number and site of acral lesions were collected for each patient included in the study. All patients were white and of Italian origin.

Lesions on the dorsal and subungual areas were excluded. Target anatomical sites of the lesions were the glabrous areas of the hands and feet. The glabrous surface was divided into 3 different locations: the palms, the soles, and the volar or lateral aspect of the fingers and hands. Dermoscopic features were classified according to the classification criteria established by Saida et al. and Malvehy and Puig.

DERMOSCOPIC EQUIPMENT

The equipment used for dermoscopic analysis consisted of (1) a stereomicroscope with magnification varying from 4x to 60x (Wild M-650; Leica Microscopy Systems Ltd, Heerbrugg, Switzerland) connected to a high-resolution, 3-charge coupled-device video camera (DXC 930P; Sony Corp, Tokyo, Japan); (2) a digital camera (Coolpix 990; Nikon Corp, Tokyo, Japan) equipped with a special dermoscopic objective with ×22 to ×66 magnification (Nevuscreen; Arke Sas, Avezzano, Italy); and (3) a fixed-magnification, 3-charge-coupled-device video camera (Dermogenius Version 1.6-SP2; Linos AG Co, Goettingen, Germany). The clinical and dermoscopic images had been stored using a standardized balance of colors and light. The digital images of the acral nevi were converted to JPEG format (Joint Photographic Experts Group; http://www.jpeg.org), with files ranging in size from 48 to 384 kilobytes.

STATISTICAL ANALYSIS

Differences between proportions of contingency tables were assessed using the χ² test. All P values cited are 2-sided, and values of P<.05 were regarded as statistically significant. All analyses were performed using a commercially available software package.

RESULTS

PATIENTS AND LESIONS

We examined dermoscopic images of 733 melanocytic lesions located on acral volar skin. The 723 acral melanocytic nevi were from 641 patients (406 females [63.4%]; mean age, 28.8 years; and 233 males [36.6%]; mean age, 24.9 years), ranging in age from 6 months to 73 years. The most common skin type was type II (59.1%), followed by type III (37.4%), type IV (2.6%), and type I (0.8%). Individual benign lesions were located on the soles (510/723 [70.5%]), volar or lateral aspect of the fingers (146/723 [20.2%]), and palms (67/723 [9.3%]). Most subjects (568/641 [88.6%]) had only a single acral melanocytic nevus. Sixty-four subjects (10.0%) had 2 nevi, and 9 subjects (1.4%) had 3 nevi.

The 10 acral melanomas, which were all located on the soles, were from 10 patients (7 men and 3 women; age range, 28-78 years; mean age, 59 years), with skin types II (n=6) and III (n=4). The dermoscopic images of the 10 acral melanomas represented 4.2% of our digital database of 242 dermoscopic images of cutaneous melanomas recorded during the period from January 1996 to May 2005.

The melanomas had all been excised. Histopathologic examination showed a Breslow thickness of 0.75 mm or less in 3 of 10 lesions, between 0.76 and 1.5 mm in 4 of 10 lesions, and greater than 1.51 mm in the remaining 3 lesions.

DERMOSCOPIC FEATURES OF ACRAL NEVI

The most common pattern was the parallel furrow pattern (Figure 1A), which was seen in 304 (42.1%) of 723 lesions; of these, 113 (37.2%) had the globular variant pattern (Figure 1B) and 43 (14.1%) had the double-lined variant pattern (Figure 1C). The latticelike pattern (Figure 1D) was identified in 108 (14.9%) of 723 lesions, and the fibrillar pattern (Figure 1E) was detected in 78 lesions (10.8%). Ninety-nine acral lesions (13.7%) showed a nontypical dermoscopic pattern (Figure 1F). The homogeneous pattern (Figure 1G) was found in 67 lesions (9.3%), the globular pattern (Figure 1H) in 39 lesions (5.4%), and the reticular pattern (Figure 1I) in 15 lesions (2.1%). Thirteen melanocytic acral nevi (1.8%) showed typical brown to black pigment network in 1 area of the lesion, along with features associated with other dermoscopic patterns, such as the parallel furrow or latticelike pattern, in another part of the same lesion (Figure 2). We have designated this new dermoscopic pattern as the acral acral melanocytic nevus.
pattern the transition pattern. None of the 723 acral nevi exhibited the parallel ridge pattern or the multicomponent pattern.

Table 1 summarizes the distribution of dermoscopic patterns according to the anatomical site of the lesions. The fibrillar, latticelike, nontypical, and homogeneous patterns were significantly more frequent on the soles than on the palms or the volar or lateral aspect of the fingers ($P<.001$, $P=.03$, $P<.001$, and $P=.03$, respectively). The transition pattern was significantly more frequent in lesions located on the lateral or volar aspect of the fingers ($P<.001$). No significant differences were found between the anatomical location of the lesions and the parallel furrow, globular, and reticular patterns ($P=.32$, $P=.34$, and $P=.79$, respectively).

In the 64 patients (10.0%) with 2 acral melanocytic lesions, the soles were the most frequent anatomical location (80/128 [62.5%]), followed by the fingers (36/128 [28.1%]) and the palms (12/128 [9.4%]). Similarly, among the 9 patients with 3 acral lesions, 15 (55.6%) of 27 lesions were present on the soles, while 10 (37.1%) and 2 (7.4%) lesions were observed on the fingers and palms, respectively.

HISTOPATHOLOGIC RESULTS OF NEVI

Ninety-nine (13.7%) of the 723 acral melanocytic nevi had been surgically excised. Clinical records of the excised lesions described dermoscopic features such as irregular pigmentation, irregular dots and globules, peripheral hyperpigmentation, or regression areas, in the absence of other features suggestive of melanoma. In some cases, the lesions had been excised because the patient described variation in the color or size of the lesion. The frequency of the distribution of the dermoscopic patterns and the histopathologic results are shown in Table 2.

DERMOSCOPIC FEATURES OF ACRAL MELANOMAS

All 3 early acral melanomas exhibited the characteristic parallel ridge pattern associated with irregularly distributed brown dots or globules of various shapes and sizes (Figure 3A). The combination of parallel ridge pattern, irregular diffuse pigmentation, irregular dots or globules, and abrupt edges was observed in all 4 cases of acral melanomas with 0.76- to 1.5-mm Breslow thickness and in 1 of the 3 acral melanomas with Breslow thickness greater than 1.51 mm (Figure 3B). The remaining 2 acral melanomas with Breslow thickness greater than 1.51 mm showed an irregular diffuse pigmentation as the prevalent dermoscopic feature, associated with irregular dots or globules and a blue or white veil (Figure 3C). A typically benign dermoscopic pattern, notably a parallel furrow or a fibrillar pattern, was also seen in 2 of 7 invasive melanomas but was focally located in only 1 part of the lesion (Figure 3B).

COMMENT

The dermoscopic aspects of lesions located on volar skin differ from those arising on nonglabrous skin, owing to the different structure of epidermis in these 2 anatomical sites. The dermoscopic classification of acral benign melanocytic lesions proposed by Saida et al9 has been widely recognized as simple and highly reproducible in clinical practice.13,16 Recently, Malvehy and Puig13 dermoscopically evaluated 210 acral melanocytic nevi in patients with atypical mole syndrome and defined 3 additional dermoscopic patterns of benign acral lesions (ie, homogeneous, globular, and reticular).
The primary purpose of our study was to investigate the dermoscopic features of 723 acral melanocytic nevi in a white population in central Italy. We found that the parallel furrow was the most common dermoscopic pattern (42.1%), followed by the latticelike (14.9%), non-typical (13.7%), fibrillar (10.8%), homogeneous (9.3%), globular (5.4%), and reticular (2.1%) patterns. In 13 lesions (1.8%), we observed a novel dermoscopic pattern, which we designated the transition pattern. This pattern combines the dermoscopic features of a typical brown to black pigment network in one area of the lesion with the dermoscopic features of a parallel furrow or latticelike pattern in another part of the same lesion. The transition pattern was observed in some benign melanocytic lesions located on the lateral aspect of the fingers, where volar skin converts into nonglabrous skin. The parallel ridge pattern and the multi-component pattern were not found in any of the 723 nevi examined.

In our series of 723 acral melanocytic nevi, we found a significantly different distribution of latticelike, non-typical, fibrillar, homogeneous, and transition patterns in 3 different anatomical locations of volar skin. Latticelike, nontypical, fibrillar, and homogeneous patterns occurred most frequently on the soles, whereas the transition pattern was more frequently seen in lesions located on the fingers. Recently, Miyazaki et al. hypothesized that anatomical and histopathologic characteristics of volar skin of the soles determine the dermoscopic aspects of acral melanocytic skin lesions. They showed the fibrillar and parallel furrow patterns to be preferentially distributed on peripheral areas of the soles and the latticelike pattern to be common in melanocytic nevi located on the arch areas of the soles. The fibrillar pattern was observed in peripheral areas of the soles, which bear direct pressure from the body weight.

Several studies reported that acral melanoma accounts for half of all melanomas in nonwhite populations and for 4% to 7.0% in white individuals. In our study, we retrieved dermoscopic images of 10 acral melanomas, representing 4.2% of all cutaneous melanomas included in our digital database.

Saida et al. recently demonstrated that the parallel ridge pattern has the highest diagnostic accuracy and positive predictive value in detecting acral melanoma in situ as compared with diffuse irregular pigmentation, while diffuse irregular pigmentation is more suggestive of invasive acral melanomas. In line with the results reported by Saida et al., the dermoscopic features of acral melanomas differed depending on the Breslow thickness of the lesion. Although our sample size was limited, the parallel ridge pattern was the most common dermo-

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Palms (%)</th>
<th>Soles (%)</th>
<th>Volar or Lateral Aspect of the Fingers (%)</th>
<th>$P$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel furrow</td>
<td>34 (11.2)</td>
<td>210 (69.1)</td>
<td>60 (19.7)</td>
<td>.32</td>
</tr>
<tr>
<td>Latticelike</td>
<td>26 (24.1)</td>
<td>61 (56.5)</td>
<td>21 (19.4)</td>
<td>.001</td>
</tr>
<tr>
<td>Fibrillar</td>
<td>0</td>
<td>75 (96.2)</td>
<td>3 (3.8)</td>
<td>.001</td>
</tr>
<tr>
<td>Nontypical</td>
<td>3 (3.0)</td>
<td>70 (70.7)</td>
<td>26 (26.3)</td>
<td>.03</td>
</tr>
<tr>
<td>Homogeneous</td>
<td>1 (1.5)</td>
<td>55 (82.1)</td>
<td>11 (16.4)</td>
<td>.03</td>
</tr>
<tr>
<td>Reticular</td>
<td>1 (6.7)</td>
<td>10 (66.7)</td>
<td>4 (26.7)</td>
<td>.79</td>
</tr>
<tr>
<td>Transition</td>
<td>0</td>
<td>3 (23.1)</td>
<td>10 (76.9)</td>
<td>.001</td>
</tr>
<tr>
<td>Globular</td>
<td>2 (5.1)</td>
<td>26 (66.7)</td>
<td>11 (28.2)</td>
<td>.34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dermoscopic Pattern</th>
<th>No. (%) of Lesions (N=723)</th>
<th>No. (%) of Lesions Excised</th>
<th>Histopathologic Diagnosis, No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Junctional Nevus</td>
<td>Compound Nevus</td>
<td>Dermal Nevus</td>
</tr>
<tr>
<td>Parallel furrow</td>
<td>304 (42.1)</td>
<td>24/304 (7.9)</td>
<td>10</td>
</tr>
<tr>
<td>Latticelike</td>
<td>108 (14.9)</td>
<td>13/108 (12.0)</td>
<td>1</td>
</tr>
<tr>
<td>Nontypical</td>
<td>99 (13.7)</td>
<td>39/99 (39.4)</td>
<td>3</td>
</tr>
<tr>
<td>Fibrillar</td>
<td>78 (10.8)</td>
<td>9/78 (11.5)</td>
<td>4</td>
</tr>
<tr>
<td>Homogeneous</td>
<td>67 (9.3)</td>
<td>9/67 (13.4)</td>
<td>0</td>
</tr>
<tr>
<td>Globular</td>
<td>39 (5.4)</td>
<td>1/39 (2.6)</td>
<td>0</td>
</tr>
<tr>
<td>Reticular</td>
<td>15 (2.1)</td>
<td>0/15</td>
<td>0</td>
</tr>
<tr>
<td>Transition</td>
<td>13 (1.8)</td>
<td>4/13 (30.8)</td>
<td>2</td>
</tr>
</tbody>
</table>
scopic pattern in early acral melanoma, whereas the multicomponent pattern was seen in 5 of 7 invasive acral melanomas and the irregular diffuse pigmentation was the most prominent feature in 2 of 7 invasive melanomas. Consistent with previous reports, our results demonstrated that acral melanomas may show a pattern typical of benign acral lesions, such as parallel furrow or fibrillar pattern, but in such cases, the benign pattern is focally located within the lesion. By contrast, in acral nevi, the benign pattern appears evenly distributed throughout the whole lesion.

In conclusion, we showed that specific dermoscopic patterns are suggestive of the benign or malignant na-
ture of a certain acral melanocytic lesion in a white population in central Italy. Also, we defined a new benign acral dermoscopic pattern, the transition pattern, which was frequently observed on the fingers. Finally, we found a significant different distribution of some dermoscopic patterns of acral nevi according to the anatomical sites.

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