Background: Acral benign melanocytic lesions in white populations, particularly in subjects with atypical mole syndrome, have been poorly characterized until recently. The advent of dermoscopy has enabled more specific diagnoses of these pigmented skin lesions.

Objective: To evaluate the clinical and dermoscopic features of benign volar lesions in a group of white patients with atypical mole syndrome.

Setting: A private medical center specializing in early diagnosis of malignant melanoma and a melanoma unit in a university hospital.

Methods: Acral melanocytic lesions in 511 patients with atypical mole syndrome were studied using standard clinical assessment and dermoscopy.

Results: Two hundred ten acral melanocytic lesions were observed in 156 of the patients: 165 lesions were present on the soles of 121 patients and 45 lesions on the palms of 35 patients. No acral malignant lesions were detected. We observed the following patterns of lesions: parallel furrow in 111 lesions (52.9%), latticelike in 26 lesions (12.4%), fibrillar or filamentous in 13 lesions (6.2%), and nontypical in 29 lesions (13.8%). In 31 lesions (14.8%), we observed 3 previously undefined patterns: a globular pattern in 11 lesions (5.2%), a homogeneous pattern in 15 lesions (7.1%), and an acral reticular pattern in 5 lesions (2.4%).

Conclusions: We observed a greater number of benign melanocytic lesions in glabrous skin than expected, probably related to our cohort selection of patients with atypical mole syndrome, although the lesions generally exhibited patterns on dermoscopy similar to those seen in Japanese studies. We defined 3 new benign dermoscopic patterns, which will enable better characterization of acral lesions.

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ACRAL LENTIGINOUS MELANOMA is the most frequent form of melanoma in nonwhite populations. In recent studies on Japanese patients, about half of all melanomas were located in the acral region, with more than 30% located on the soles of the feet.1,2 In white populations, acral melanoma accounts for about 4.5% to 7% of melanomas.3,4 The prognosis is poor for white patients with acral melanoma compared with Japanese patients. This may be because acral lesions in Japanese populations tend to be detected earlier.4 These lesions may be difficult to diagnose by visual examination even for experienced dermatologists. Therefore, a better method for characterization of acral melanocytic lesions is of great interest. Dermoscopy, dermatoendoscopy, or epiluminescence microscopy is a noninvasive technique that allows an in vivo diagnosis of pigmented skin lesions. Dermoscopy has been demonstrated to significantly improve the accuracy in diagnosing melanocytic lesions and malignant melanoma.5,12 More specific identification of benign dermoscopic patterns should avoid unnecessary surgery on palms and soles.

In recent years, Japanese studies13-15 have reported various dermoscopic features of benign and malignant melanocytic volar skin lesions identified on dermoscopy. In these studies, characteristic patterns were defined for benign lesions (parallel furrow, latticelike, fibrillar or filamentous, and nontypical) and for melanomas (parallel ridge, multicomponent, and serrated). Previous studies16,17 have reported the clinical features of acral melanocytic lesions in white populations. Although dermoscopic evaluation of these lesions in white populations has been described,18-21 no reports have studied a large series of patients or a significant number of patients with atypical mole syndrome (AMS). Therefore, we designed a cohort...
study to characterize volar benign melanocytic lesions in AMS patients by clinical examination and digital dermoscopy.

METHODS

SETTING
The study was conducted at the early diagnosis unit in the Center for Diagnosis of Pigmentary Lesions, a private medical center in Barcelona dedicated to the early diagnosis of melanocytic lesions and follow-up of patients at high risk for cutaneous melanoma.

PATIENTS

Five hundred eleven consecutively seen patients (168 men [32.9%] and 343 women [67.1%]; mean age, 34 years [range, 15-67 years]) with AMS were included between April 1, 1998, and July 1, 2000. Patients’ personal and familial history of malignant melanoma, their total count of nevi, and the number of volar lesions were obtained. All patients included in the study were referred from their dermatologists as being affected by AMS. Inclusion criteria were: (1) more than 100 nevi in adulthood, (2) more than 50 nevi in childhood, and (3) 1 previously removed lesion with a histopathological diagnosis of dysplastic nevus. The mean ± SD number of melanocytic skin lesions per patient was 144.16 ± 94.38 (range, 10-600).

INSTRUMENTATION

All images from patients were stored using a standardized digital system (MoleMax; Derma Instruments, Vienna, Austria). This system permits the electronic storage of an unlimited number of images per patient, including total body photographs and clinical and dermoscopic images of every lesion considered. Pixel resolution was 640 to 480 at 24-bit color depth, and images were stored without compression in bitmap format. Dermoscopic images were captured at 30-fold magnification, with a maximum field of 1 cm. Images were obtained under standardized conditions of color and light. Photographs of the clinical view and dermoscopy with a Heine Dermaphot system (Heine Optotechnik, Herrsching, Germany) at a fixed magnification of ×10 were also obtained for all the removed lesions and other selected benign lesions for further investigation.

SELECTION OF LESIONS

Patients were examined for acral melanocytic lesions by us and followed up in detail. Lesions on the volar area of digits, palms, and soles only were considered. Dorsal areas and subungual lesions were excluded. All the volar lesions were documented clinically and dermoscopically by the digital system. Images were then stored for further examination and analysis.

DESCRIPTION OF DERMOSCOPIC PATTERNS

All the digitized lesions were analyzed independently by us and categorized into 1 of the following 5 major groups (Figure 1):

Parallel Furrow Pattern

Parallel furrow pigmentation mainly follows the furrows of skin markings. In some cases, brown dots or globules may be present along the ridges. Some lesions exhibit variations, such as double-lined pigmentation along the sulci.

Figure 1. Schema of the benign dermoscopic patterns of melanocytic lesions in glabrous skin found in volar skin of patients with atypical mole syndrome included in the study. The parallel furrow pattern is the most common (A). Some variations of this pattern are represented in B through D. In some lesions, the parallel pigmentation appears double-lined or in combination with globules; in others, the lines of the furrows disappear and only globules can be seen. The other benign patterns are latticelike (E and F), fibrillar or filamentous (G), nontypical (H), homogeneous (I), globular (J), and acral reticular (K). The parallel ridge pattern (L) is associated with malignancy and must be differentiated from the benign parallel pattern. White dots in the schema represent the openings of sweat ducts.

Latticelike Pattern

Latticelike pigmentation follows the furrows of the skin markings and linear bands of pigment, crossing them from one to the next. In some cases, the parallel pigmentation of the furrow can disappear. Dots and globules can also be present.

Fibrillar or Filamentous Pattern

The fibrillar or filamentous pattern comprises parallel fine streaks crossing the skin markings in a slanting direction.

Nontypical Pattern

Nontypical pattern lesions cannot be classified into the previous groups. No specific features of malignancy are present. To differentiate it from the multicomponent pattern (characteristic of malignancy), the nontypical pattern has no clearly defined patterns around the lesion, whereas the multicomponent pattern has more than 2 different components with well-defined patterns (eg, homogeneous pigmentation, fibrillar pattern, latticelike pattern, dots and globules, parallel ridge pattern, and others).

Dermoscopic Findings in Malignant Lesions

Malignant lesions on dermoscopy have a parallel ridge pattern, consisting of pigmentation distributed in the ridges of the skin markings. Diffuse multicomponent pigmentation is composed of pigmented blotches of variegated shades of brown observed in some portions of the tumor. Also associated with malignancy on dermoscopy are a serrated pattern, abrupt edges, diffuse pigmentation, peripheral irregular or atypical dots and globules, multiple colors, atypical streaks, blue-white veils, regression structures, radial streaming, and pseudopods.

Figure 1.

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CRITERIA FOR REMOVING LESIONS

Lesions with a diameter of more than 7 mm are suspicious for malignancy and should be removed, according to the criteria established by Saida.22 Some lesions with clearly defined signs of benign nevi on clinical and dermoscopic examination (regular parallel furrow, latticelike, and fibrillar or filamentous patterns) were not removed for histopathological study.13,14,23 Some lesions exhibiting irregular parallel furrow pattern, irregular latticelike pattern, fibrillar or filamentous pattern, or nontypical patterns were removed after the initial examination if there was suspicion of malignancy (ie, multiple colors, and irregular dots and globules), because some malignant lesions with these patterns have been reported.13,22 Other lesions 7 mm or less in maximum diameter22 with the same patterns but with no other characteristics of malignancy were reassessed with digital dermoscopy evaluation every 3 to 6 months to detect short-term modifications. In the case of stable lesions, a digital follow-up was performed to characterize their evolution in a posterior analysis.

RESULTS

Two hundred ten volar lesions were detected in 156 of 511 patients included in the study (Table 1). Of these, 165 lesions were present on the soles in 121 patients (23.7% of the patients included), and 45 lesions were present on the palms in 35 patients (6.8% of the patients included). None of the lesions demonstrated clinical signs (diameter > 7 mm, ABCD rule)22 of malignancy. By dermoscopy, we observed the following patterns: parallel, including parallel furrow, in 111 lesions (52.9%) (Figure 2); latticelike in 26 lesions (12.4%) (Figure 3); fibrillar or filamentous in 13 lesions (6.2%) (Figure 4); and nontypical in 29 lesions (13.8%) (Figure 5). In addition, 11 lesions (5.2%) (Figure 6) exhibited a globular pattern independent of the skin markings and without an associated parallel pattern. We termed this a globular pattern. A light brown homogeneous pigmentation with an amorphous structure was observed in 15 lesions (7.1%) (Figure 7), which we termed a homogeneous pattern. In 5 lesions (2.4%) of the soles (Figure 8), we observed a well-defined, distinctive acral reticular pattern. None of the lesions showed a parallel ridge pattern characteristic of malignancy or other dermoscopic features previously associated with acral melanoma.13,14,22

Table 1. Dermoscopic Patterns and Location of the Lesions Observed in the Study

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Soles (n = 165)</th>
<th>Palms (n = 45)</th>
<th>Total (N = 210)</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel furrow</td>
<td>82 (49.7)</td>
<td>29 (64.4)</td>
<td>111 (52.9)</td>
<td>.79</td>
</tr>
<tr>
<td>Latticelike</td>
<td>17 (10.3)</td>
<td>9 (20.0)</td>
<td>26 (12.4)</td>
<td>.08</td>
</tr>
<tr>
<td>Fibrillar or filamentous</td>
<td>13 (7.9)</td>
<td>0</td>
<td>13 (6.2)</td>
<td>.04</td>
</tr>
<tr>
<td>Nontypical</td>
<td>27 (16.4)</td>
<td>2 (4.4)</td>
<td>29 (13.8)</td>
<td>.049</td>
</tr>
<tr>
<td>Homogeneous</td>
<td>12 (7.3)</td>
<td>3 (6.7)</td>
<td>15 (7.1)</td>
<td>.59</td>
</tr>
<tr>
<td>Globular</td>
<td>9 (5.5)</td>
<td>2 (4.4)</td>
<td>11 (5.2)</td>
<td>.56</td>
</tr>
<tr>
<td>Acral reticular</td>
<td>5 (3.0)</td>
<td>0</td>
<td>5 (2.4)</td>
<td>.29</td>
</tr>
</tbody>
</table>

*Statistical significance of each pattern was determined using the \( \chi^2 \) test of independence and the Fisher exact test, with \( P < .05 \) defining statistical significance.
Forty-seven lesions (22.4%) were removed for histopathological diagnosis. All of these lesions were benign (Table 2). Lesions with parallel furrow, lattice-like, fibrillar or filamentous, and acral reticular patterns were all junctional or compound nevi, whereas lesions exhibiting globular patterns were all compound nevi. Two of the 15 lesions with homogeneous patterns were removed; one was a compound nevus and the other was a dermal nevus. Nineteen (65.5%) of the 29 lesions with nontypical dermoscopic patterns were removed. Most of them were compound nevi, with 1 combined lesion, 3 junctional nevi, and 5 dermal nevi. Seven of these nontypical lesions exhibited fibrosis.

COMMENT

In recent years, Japanese researchers have studied melanocytic lesions in glabrous skin by dermoscopy. Saída and coworkers14 studied 108 benign lesions, 6 melanomas in situ, and 16 acral lentiginous melanomas, describing 4 distinct patterns. Three patterns associated with benign lesions were the parallel furrow (54%), lattice-like (21%), and fibrillar or filamentous (15%) patterns. Because 1 melanoma in situ among 16 studied fibrillar lesions exhibited an exclusively fibrillar or filamentous pattern, these authors concluded that malignancy could not be excluded when such a pattern is observed. In addition, they described a novel pattern associated with malignancy, the parallel ridge pattern, which was observed in 5 of 6 melanomas in situ and in 15 of 16 acral lentiginous melanomas. In 11 of the benign lesions, none of the previous patterns was observed, and these were classified as having a nontypical pattern. Other features in melanomas seen on dermoscopy were diffuse multicomponent pigmentation (composed of pigmented blotches of variegated shades of brown observed in some portions of the tumor) and a serrated pattern (consisting of parallel streaks at the edge of the lesion that correspond to the radial streaming seen on dermoscopy in other locations, ie, the radial extension area of a melanoma). Other findings include irregular dots and globules, blue-white veils, depigmented areas, irregular shape, irregular pigmentation, presence of multiple colors, abrupt edges, irregular blotches, disappearance of the eccrine duct openings, and pseudopods. In our view, the major contribution of the pattern system of Saída and coworkers is its simplicity of classification of melanocytic lesions by well-defined dermoscopic criteria.

In similar work, Akasu and coworkers15 described 5 patterns in benign lesions after dermoscopic examination of 500 melanocytic plantar nevi in 440 Japanese patients.
The authors used as control subjects 4 patients with melanomas in situ, 2 with acral lentiginous melanomas, 45 with verruca vulgaris, and 10 with black heel. In our experience, the classification of Akasu et al is more complex and difficult to apply in routine clinical examinations.

Saida constructed an algorithm combining clinical and dermoscopic criteria for the management of melanocytic lesions in volar skin and early diagnosis of melanoma. All acquired melanocytic lesions with a diameter larger than 7 mm should be considered suspicious and removed. In the case of lesions 7 mm or less in maximum diameter, dermoscopic criteria should be evaluated to decide between excision or observation of the lesion. This algorithm, if applied, could reduce the number of benign volar lesions removed, with a high sensitivity for the early diagnosis of ALM. In our series, none of the acquired melanocytic lesions exhibited a diameter larger than 7 mm.

**INCIDENCE OF VOLAR LESIONS IN WHITE POPULATIONS WITH AMS**

We observed more volar benign lesions than previously reported for white populations. This may be explained by study differences in ethnicity (Mediterranean vs Northern European or North American populations) or the mean age of patients. We included AMS patients, with a genetic predisposition to mole development, who would be expected to have more volar lesions. Differences in the mean age of patients between studies are likely to skew comparative results, because some nevi in volar skin fade and disappear during life, as we have observed on dermoscopic digital follow-up of lesions.

**MAJOR BENIGN DERMOSCOPIC PATTERNS IN WHITE POPULATIONS**

In general, our findings of acral patterns in white patients were similar to those obtained in the Japanese studies. The 3 major benign patterns (parallel furrow, latticelike, and fibrillar or filamentous) were predominant in both populations. The parallel furrow is the most common pattern, and no difference in the proportion of lesions with this pattern was found between the series. In our patients, the latticelike pattern (12.4%) and fibrillar or filamentous pattern (6.2%) were less frequent than in the Japanese series (P<.05). It is unclear whether this is a result of patient age differences (age was not reported in the Japanese studies by Saida and coworkers) or of the inclusion of patients with AMS in our series. Our study included lesions of glabrous skin of the hands, and this could have affected the results also. In our series, the fibrillar or filamentous pattern and the nontypical pattern were more frequent in the soles compared with palms.

**THE NONTYPICAL PATTERN**

In papular benign lesions documented as dermal nevi or compound nevi, we observed a pattern consisting of blue or brown pigmentation in an irregular and mottled appearance and not distributed according to the skin markings. This corresponds to the nontypical pattern described by Akasu and coworkers. The loss of the benign classic patterns associated with the sulci and crypta of glabrous skin found in these papular lesions can be explained by the tumoral growing of mature nests of nevi cells, which can change the pigment distribution and consequently the dermoscopic image. In this case, the blue pigmentation reflects the presence of melanin in the deeper part of the dermis. This characteristic of some benign melanocytic lesions can be easily recognized.

None of these nontypical lesions had characteristic features of malignancy, although 65.5% (19/29) were removed for histopathological analysis and were found to

### Table 2. Histopathological Results According to Dermoscopic Patterns Observed in the Study

<table>
<thead>
<tr>
<th>Pattern</th>
<th>LR/TL (%)</th>
<th>Junctional Nevi</th>
<th>Compound Nevi</th>
<th>Dermal Nevi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel furrow</td>
<td>10/111 (9.0)</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Latticelike</td>
<td>6/26 (23.1)</td>
<td>1</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Fibrillar or filamentous</td>
<td>5/13 (38.5)</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Globular</td>
<td>3/11 (27.3)</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Acral reticular</td>
<td>2/5 (40.0)</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Homogeneous</td>
<td>2/15 (13.3)</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nontypical</td>
<td>19/29 (65.5)</td>
<td>3</td>
<td>11 (1 Combined nevus)</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>47/210 (22.4)</td>
<td>12</td>
<td>29</td>
<td>6</td>
</tr>
</tbody>
</table>

Abbreviations: LR, number of lesions with the pattern that were removed; TL, total number of lesions with the pattern.

### Table 3. Prevalence of Observed Dermoscopic Patterns and Comparison With Japanese Studies

<table>
<thead>
<tr>
<th>Pattern</th>
<th>White Populations</th>
<th>Japanese Populations</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N = 210)</td>
<td>(N = 108)</td>
<td></td>
</tr>
<tr>
<td>Parallel‡</td>
<td>111 (52.9)</td>
<td>58 (53.7)</td>
<td>.89</td>
</tr>
<tr>
<td>Latticelike</td>
<td>26 (12.4)</td>
<td>23 (21.3)</td>
<td>.94</td>
</tr>
<tr>
<td>Fibrillar or filamentous</td>
<td>13 (6.2)</td>
<td>16 (14.8)</td>
<td>.01</td>
</tr>
<tr>
<td>Other§</td>
<td>60 (28.6)</td>
<td>11 (10.2)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*According to Oguchi and Saida and coworkers.
†Statistical significance of each pattern was determined using the χ² test of independence, with P<.05 defining statistical significance.
‡Including parallel furrow and parallel globular patterns.
§Including in the white populations the nontypical, homogenous, globular, and reticular patterns, and in the Japanese populations the nontypical pattern.
be benign nevi. Other lesions were recorded with the digital system for follow-up and further analysis.

There are several hypothetical explanations for the appearance of these nontypical patterns:

1. Some of the benign lesions may change their dermoscopic appearance over time, such that the benign well-defined patterns change, with partial or complete loss of pigmentation. The presence of fibrosis in some of these lesions could be responsible for the loss of acral structures (furrows and ridges), causing this nontypical pattern.
2. Some congenital nevi, compound nevi, or dermal nevi could present a nontypical pattern due to the buildup of pigment in deeper parts of the tumor.
3. The nontypical pattern could include some lesions with histological atypia (dysplastic nevi), as suggested by previous investigations in a Japanese population, but not confirmed in our series.

DIFFERENT DERMOSCOPIC PATTERNS OBSERVED IN BENIGN LESIONS

One of the main findings in our study was the definition of 3 novel patterns distinct from the parallel furrow, fibrillar or filamentous, and latticelike patterns. One of these “minor” benign patterns was a homogeneous pattern (Figure 7), present in 7.1% of the lesions. It is characterized by regular light brown pigmentation, without any other distinctive feature. During follow-up with dermoscopy, some of the lesions evolved from a fibrillar or filamentous or parallel furrow pattern to this homogeneous pattern and, in some cases, disappeared completely. Therefore, some lesions with this pattern could correspond to slightly pigmented dermal nevi.

Second, a globular pattern (Figure 6), composed of dots and globules in an area of diffuse light brown pigmentation, was observed in 5.2% of the lesions in our study. In this pattern, a nonparallel distribution of globules was present, different from the parallel globular pattern considered to be a benign variety of the parallel furrow pattern. Lesions with this globular pattern were found to be compound nevi when removed.

Third, we observed an acral reticular pattern consisting of reticulated pigmentation similar to the pigment network of nonglabrous skin (Figure 8). These lesions were located on the soles and could be differentiated from the latticelike pattern. In the acral reticular pattern, the lines of the grid were similar to the well-defined pigment network of nonglabrous skin, independent of the skin markings of the sole. No lesion in this group presented a parallel furrow, fibrillar or filamentous, or latticelike pattern. Therefore, we consider it to be distinct from these major patterns.

CONCLUSIONS

1. Benign melanocytic lesions are common in white populations with AMS. None of the lesions observed showed clinical or dermoscopic signs of malignancy.
2. Dermoscopic patterns described in Japanese populations are also found in white populations. The use of dermoscopy aids in the identification of benign lesions and can reduce the number of unnecessary biopsies of these lesions.
3. There may be some differences in the frequency of the various patterns between white and Japanese populations, with a lower proportion of latticelike and fibrillar or filamentous patterns found in the white population studies.
4. Three new well-defined patterns seen on dermoscopy were distinguished in a lower but significant proportion of lesions: homogeneous, globular, and acral reticular patterns.
5. The nontypical pattern is seen in benign lesions; none of these lesions were malignant when removed or had a malignant evolution during follow-up. This pattern could be explained by the normal evolution of lesions into mature nevi, by the existence of mature nests of a deeper nevus component and fibrosis (with disruption of normal distribution of pigment according to skin markings), or by the existence of histological atypia with architectural disarray (not confirmed in our series). Further studies with digital follow-up of lesions will clarify these questions.

Because subsets of benign pigmented lesions can now be accurately differentiated, epidemiological studies of pigmented skin lesions may be performed to improve our knowledge of these benign lesions and their clinical management.

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REFERENCES


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News and Notes

The IVth World Congress of the International Academy of Cosmetic Dermatology (IACD), will be held July 3-5, 2005, at the Palais de Congres, Paris, France. Web site: www.iacd-paris2005.com. Contact: IACD 2005 c/o MCI France, 11 Rue de Solferino, 75007 Paris, France; phone: ++33 (0)1 53858251; fax: ++33 (0)1 53858283; e-mail: iacd2005@mci-group.com