Dermoscopic Changes in Acral Melanocytic Nevi During Digital Follow-up

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Objective: To investigate changes in dermoscopic patterns of acquired acral melanocytic nevi (AAMN) over time.

Design: Retrospective analysis of digital dermoscopic follow-up of 230 AAMN located on acral volar skin.

Setting: Outpatient clinics at university dermatology departments.

Patients: A total of 230 AAMN located on the soles (n=149), fingers (n=62), and palms (n=19), of 230 white subjects 14 years or younger (n=81), 15 to 30 years (n=72), and older than 30 years (n=77).

Main Outcome Measure: Comparison of baseline and follow-up dermoscopic patterns.

Results: Individual AAMN had a digital follow-up of 6 months (n=59), 12 months (n=74), 18 months (n=44), and 24 months (n=53). Baseline dermoscopic images showed the following patterns: parallel furrow (48.8%), latticelike (16.1%), fibrillar (10.9%), nontypical (10.9%), homogeneous (4.8%), globular (3.5%), transition (3.5%), and reticular (2.6%). Dermoscopic changes over time were observed in 42 of the 230 AAMN (18.3%), with the greatest frequency of changes occurring in patients 14 years or younger (23 of 81 lesions; 28.4%) (P=.005). The parallel furrow pattern (25.9%) showed more variations over time than other dermoscopic patterns (11.0%) (P=.004). The frequency of change increased linearly over time (P=.001). Four of 7 clinically regressing nevi showed a homogeneous pattern at the last examination.

Conclusions: Dermoscopic changes of AAMN are most common in subjects younger than 14 years. The parallel furrow pattern appears to be the dermoscopic pattern most subject to change, while the homogeneous pattern may be seen also in AAMN showing clinical and dermoscopic involution.

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The anatomic structure of acral volar skin determines unique dermoscopic features of pigmented skin lesions located in this anatomic site.1-3 Saida et al4 examined acral melanocytic nevi in an Asian population and first described specific dermoscopic features of these lesions: the parallel furrow pattern and its globular and double-lined variants, the latticelike pattern, the fibrillar pattern, and the nontypical pattern. Three additional dermoscopic features of acral melanocytic nevi, namely the globular, homogeneous, and reticular patterns, were subsequently described in patients with atypical mole syndrome.5 Our group recently demonstrated that such dermoscopic classifications of acral melanocytic nevi also apply to a white population in central Italy.6 We also described a transition pattern, observed in benign acral melanocytic nevi on the lateral aspect of the fingers, that combines specific dermoscopic features of volar and nonglabrous skin.6

Even for experienced dermatologists, acral melanocytic nevi may be difficult to differentiate from early acral melanoma by clinical evaluation alone.7,9 However, acral melanoma shows distinct dermoscopic features, including the parallel ridge pattern seen in melanoma in situ and the diffuse irregular pigmentation seen in invasive acral melanoma.6,10 Digital dermoscopic surveillance with short-term monitoring is a valuable tool for early detection of melanoma, especially in cases in which melanocytic skin lesions do not show clear-cut dermoscopic criteria for malignancy at initial observation.11-16 Dermoscopy has been used to follow the morphologic changes over time in benign melanocytic lesions such as congenital, dysplastic, and Spitz-Reed nevi.17-20 However, to our knowledge, the type and fre-
frequency of dermoscopic changes of melanocytic lesions located on acral volar skin have been not yet described.

In this study we analyze a series of acral melanocytic nevi to evaluate the dermoscopic patterns of such lesions and changes observed during digital dermoscopic follow-up.

**METHODS**

Dermoscopic images evaluated in this study had been entered in the databases of the outpatient clinics of the Departments of Dermatology of the University of L’Aquila, L’Aquila, Italy, and the Second University of Naples, Naples, Italy, between January 2002 and December 2005. We retrieved all images of acquired melanocytic lesions located on acral volar skin that included a digital dermoscopic follow-up and that did not show clear-cut dermoscopic criteria of malignancy at initial observation. The selected lesions had a follow-up period ranging from 6 to 24 months. The images had been obtained with a digital imaging dermoscopic system using a standardized balance of colors and light (Dermogenius, version 1.6-SP2; Linos AG, Göttingen, Germany [original magnification ×30]; or Videocap; DS Medica, Milan, Italy [original magnification ×20]).

Dermoscopic patterns of all images were classified according to the standard dermoscopic classification criteria for acral melanocytic nevi.1,4,6 The nontypical pattern was defined by both the presence of dermoscopic features not conforming to any of the typical patterns (parallel furrow, latticelike, fibrillar, reticular, homogeneous, globular, and transition) and the absence of a multicompartment pattern suggestive of melanoma.1,6,10

Dermoscopic images stored on file were compared for each lesion. We defined as substantial variation any change from a given benign dermoscopic pattern observed at baseline into a different pattern observed at the follow-up visit. Changes over time of the parallel furrow pattern into its globular or double-line variants, and vice versa, were considered minimal variations. Darkening or lighter appearance as well as increase or reduction in size of the lesions were also evaluated.

Clinical records from follow-up examinations of the excised lesions described dermoscopic features such as bluish areas, irregular dots and/or globules, and irregular pigmentation.

The proportion of lesions with dermoscopic modifications over time (substantial or minimal variation) was calculated for each of the categorical variables of sex, age, anatomic site, and dermoscopic patterns (parallel furrow pattern and other patterns). Associations between variations expressed as dichotomous variable (absent or present) and categorical variables were assessed with the $\chi^2$ test calculated on contingency tables. The Fisher exact test was calculated when the expected count was less than 5. The same analysis was performed stratifying by maximum length of follow-up period (6, 12, 18, and 24 months). The $\chi^2$ statistic for trend was used to test the null hypothesis of no association between proportion of variation and follow-up time.

**RESULTS**

**GENERAL DATA**

We analyzed the dermoscopic images of 230 melanocytic nevi located on acral volar skin of 230 subjects (135 female [58.7%] and 95 male [41.3%]) with a mean age of 24.4 years. At initial observation, 81 of 230 subjects were 14 years or younger (35.2%); 72 of 230 ranged in age from 15 to 30 years (31.3%), and 77 of 230 were older than 30 years (33.5%). All patients were white and of Italian descent.

Anatomic sites of the lesions were the soles (149 of 230; 64.8%), volar or lateral aspects of the fingers or toes (62 of 230; 27.0%), and palms (19 of 230; 8.2%). The mean follow-up period was 14.4 months. Digital follow-up was available at 6 months for 59 of 230 lesions (25.7%); at 12 months for 74 of 230 lesions (32.2%); at 18 months for 44 of 230 lesions (19.1%); and at 24 months for 53 of 230 lesions (23.0%).

**DERMOSCOPIC PATTERNS AT BASELINE AND FOLLOW-UP IMAGES**

The baseline images of the 230 lesions showed the following benign dermoscopic features: (1) parallel furrow pattern in 112 (48.7%), including 37 showing the globular variant and 20 showing the double-line variant; (2) latticelike pattern in 35 (15.2%); (3) fibrillar pattern in 25 (10.8%); (4) nontypical pattern in 25 (10.8%); (5) homogeneous pattern in 11 (4.8%); (6) globular pattern in 8 (3.5%); (7) transition pattern in 8 (3.5%); and (8) reticular pattern in 6 (2.6%).

Dermoscopic changes in the 230 lesions over time were observed in 42 acral melanocytic nevi (18.3%). A time-related linear increase in the frequency of changing nevi was found ($P = .001$ for trend). Dermoscopic patterns changed in 5 of 59 lesions (8.5%) after a maximum follow-up period of 6 months; in 10 of 74 (13.5%) after 12 months; in 10 of 44 (22.7%) after 18 months; and in 17 of 53 (32.1%) after 24 months.

The highest frequency of variation was found in acral nevi of patients 14 years or younger (23 of 81 lesions; 28.4%) followed by nevi of subjects older than 30 years (13 of 77 lesions; 16.9%) and those between 15 and 30 years (6 of 72 lesions; 8.3%) ($P = .005$) (Table 1). In subjects 14 years or younger and older than 30 years, the frequency of dermoscopic changes over time was related to

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**Table 1. Distribution of Global Dermoscopic Variations of Acral Melanocytic Nevi**

<table>
<thead>
<tr>
<th>Patient Age, y</th>
<th>Follow-up, mo</th>
<th>Nevi Changed</th>
<th>Nevi Changed</th>
<th>Nevi Changed</th>
<th>Nevi Changed</th>
<th>Nevi Changed</th>
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</thead>
<tbody>
<tr>
<td>≤14</td>
<td>6</td>
<td>27 (11.1)</td>
<td>18 (22.2)</td>
<td>14 (35.7)</td>
<td>22 (50.0)</td>
<td>81 (28.4)</td>
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<tr>
<td>15-30</td>
<td>12</td>
<td>17 (5.9)</td>
<td>28 (10.7)</td>
<td>14 (7.1)</td>
<td>13 (7.7)</td>
<td>72 (6.3)</td>
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<tr>
<td>&gt;30</td>
<td>18</td>
<td>15 (6.7)</td>
<td>28 (10.7)</td>
<td>16 (25.0)</td>
<td>5 (27.8)</td>
<td>77 (16.9)</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>59 (8.5)</td>
<td>74 (13.5)</td>
<td>44 (22.7)</td>
<td>53 (32.1)</td>
<td>230 (18.3)</td>
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</table>

<table>
<thead>
<tr>
<th>Follow-up, mo</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>59 (8.5)</td>
</tr>
<tr>
<td>12</td>
<td>74 (13.5)</td>
</tr>
<tr>
<td>18</td>
<td>44 (22.7)</td>
</tr>
<tr>
<td>24</td>
<td>53 (32.1)</td>
</tr>
</tbody>
</table>

*Unless otherwise indicated, data are reported as number of nevi or number (percentage) of nevi showing change.

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the time of observation ($P = .002$ and $P = .05$ for trend, respectively), while this association was not found in patients aged between 15 and 30 years (Table 1).

**Table 2.** Patterns of the Acral Melanocytic Nevi That Changed During Dermoscopic Follow-up

<table>
<thead>
<tr>
<th>Follow-up, mo</th>
<th>Parallel Furrow Pattern</th>
<th>Other Patterns</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Nevi</td>
<td>Changed</td>
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<td>12</td>
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<td>22</td>
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<tr>
<td>24</td>
<td>29</td>
<td>13 (44.8)</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>29 (25.9)</td>
</tr>
</tbody>
</table>

*a* Unless otherwise indicated, data are reported as number (percentage) of nevi or number of nevi showing change.

*b* Fisher exact test.

Minimal variations in the parallel furrow pattern were the most common dermoscopic changes over time (10 of 42; 23.8%), followed by substantial variations in this pattern such as change into fibrillar (9 of 42; 21.4%), latticelike (6 of 42; 14.3%), and nontypical patterns (4 of 42; 9.5%) (Figure 1). None of the changing lesions exhibited significant increase in size or diffuse darkening appearance, while 1 of 42 showed a substantial reduction in diameter (2.4%). **Table 3** summarizes the variations in dermoscopic patterns observed over time.

**HISTOPATHOLOGIC RESULTS OF NEVI**

Surgical excision was performed in 20 of 230 acral melanocytic nevi (8.7%). Among these 20 lesions, histopathologic examination allowed a diagnosis of compound nevus for 12 (60%), junctional nevus for 6 (30%), and dermal nevus for 2 (10%). Clinical records from follow-up examinations described morphologic changes in all of these lesions. In 13 of the 20 excised nevi (65.0%), the following dermoscopic features were detected: bluish areas in 5 (38.5%) (Figure 2A and B), irregular dots and/or globules in 5 (38.5%) (Figure 2C and D), and brown to black irregular pigmentation in 3 (23.0%). Dermoscopically irregular globules histopathologically correlated with nests of pigmented melanocytes at the dermoeidermal junction and in the dermis. The bluish areas corresponded to nests of heavily pigmented melanocytes and numerous melanophages in the medium and lower dermis, while irregular pigmentation was related to nests of heavily pigmented melanocytes at the dermoeidermal junction, and irregular dots corresponded to focal transepidermal elimination of melanin in the cornified layer.

Seven of the 20 excised lesions exhibited a clinically lighter appearance over time and decreased pigmentation by dermoscopic analysis (35.0%). Follow-up images revealed a homogeneous pattern in 4 of these 7 lesions (Figure 2E and F), while the remaining 3 nevi showed the same dermoscopic pattern observed at baseline (Figure 2G and H). Histopathologic examination of these 7 lesions showed predominantly intradermal melanocytes with no evidence of regression areas.

**COMMENT**

Benign melanocytic lesions located on acral volar skin are “dynamic” lesions. In our series of 230 acquired acral melanocytic nevi, we observed morphologic changes in 18.3%
of the lesions over a follow-up period ranging from 6 to 24 months. However, the rate of dermoscopic change observed in our series of nevi cannot be compared directly with rates seen in follow-up studies with different inclusion criteria or in studies evaluating melanocytic nevi located on nonglabrous skin.11,17,21,22 Kittler et al11 observed substantial dermoscopic change over time in 5.9% of common nevi and in 9.1% of atypical nevi after a median follow-up of 12.6 months. In a subsequent study,17 researchers showed that nearly 80% of nevi with a peripheral rim of brown globules enlarged during a median follow-up period of 11.4 months. In contrast, Braun et al22 reported a 69% rate of dermoscopic variations over time in 150 melanocytic lesions, including common and Spitz nevi, that were observed over 2 years.

In our series of acral melanocytic nevi, the frequency of dermoscopic modifications linearly increased over time ($P = .001$), with changes observed in 8.5% of nevi after 6 months of follow-up; 13.5% after 12 months; 22.7% after 18 months; and in 32.1% of lesions after 24 months. Dermoscopic changes of acral nevi were significantly more frequent in subjects 14 years or younger ($P = .005$), with approximately 55% of the changes we observed over time seen in this age group. Notably, in patients 14 years or younger changes were found in 50% of nevi after a follow-up of 24 months.

An earlier study indicated that dysplastic melanocytic nevi located on nonglabrous skin become more stable with increasing age of subjects.23 Banky et al24 recently reported that the incidence of changed nevi in patients at high risk for melanoma significantly decreased with increasing age, with more than a 2-fold higher incidence in subjects younger than 30 years compared with older subjects.

In our study, the parallel furrow pattern was the most frequent and the most changing dermoscopic pattern of acral melanocytic nevi. In fact, although the rate of pattern modifications linearly increased over time for all dermoscopic features, we found a higher frequency of variations of the parallel furrow pattern (25.9%) than with other dermoscopic patterns (11.0%) ($P = .004$).

During a mean follow-up period of 14.4 months, none of the 230 nevi in our series showed the parallel ridge pattern or diffuse irregular pigmentation, which are the most typical dermoscopic features of acral melanoma.1,6,10 Furthermore, histopathologic examination of the 20 surgically excised nevi showed no signs of melanoma. These findings support the view that the only acral lesions that require surgical excision are those that exhibit clear-cut dermoscopic features suggestive of malignancy.1,4,6

A few studies have reported that the number of nevi decreases with age, suggesting that the lesions regress.25,26 Seven of the 230 acral nevi in our series showed decreased pigmentation over time by clinical and dermoscopic examination (3.1%), but none of these lesions displayed histopathologic features of regression. In addition, 4 of these 7 nevi showed a light brown, unstructured, homogeneous pigmentation at the follow-up dermoscopic examination. This finding suggests that the homogeneous pattern, which has been described as a distinct dermoscopic pattern of acral nevi,5,6 may also be seen in acral melanocytic nevi exhibiting clinical and dermoscopic involution.
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