Dermoscopy of Solitary Angiokeratomas

A Morphological Study

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Objectives: To describe the dermoscopic structures and patterns associated with solitary angiokeratomas and to determine the sensitivity, specificity, positive predictive value, negative predictive value, and reproducibility of these dermoscopic features.

Design: Multicenter retrospective study.

Setting: University hospitals in Spain, Italy, Argentina, New York City, and Austria.

Patients: There were 256 patients total, and 32 specimens each of solitary angiokeratomas, melanocytic nevi, Spitz-Reed nevi, malignant melanomas, pigmented basal cell carcinomas, dermatofibromas, seborrheic keratoses, and other vascular lesions (19 angiomas, 7 pyogenic granulomas, 3 spider nevi, 2 lymphangiomas, and 1 venous lake) were consecutively collected from the laboratories of 8 hospitals. Diagnoses of all patients' lesions were confirmed histopathologically.

Intervention: Dermoscopic examination.

Main Outcome Measures: The frequency, sensitivity, specificity, positive predictive value, negative predictive value, intraobserver agreement, and interobserver agreement of the different dermoscopic features associated with solitary angiokeratomas were calculated, and the differences were evaluated using the χ² or Fisher exact test.

Results: Six dermoscopic structures were evident in at least 50% of the solitary angiokeratomas: dark lacunae (94%), whitish veil (91%), erythema (69%), peripheral erythema (53%), red lacunae (53%), and hemorrhagic crusts (53%). Dark lacunae exhibited a sensitivity of 93.8% and a specificity of 99.1% (P < .001 for both), not being found in malignant melanomas or pigmented basal cell carcinomas. The positive predictive value was 93.8%, and the negative predictive value was 99.1%. The intraobserver agreement was perfect (κ, 1.00), and the interobserver agreement was excellent (κ range, 0.83-1.00) (P < .001 for both). Pattern 1, consisting of dark lacunae and whitish veil, exhibited a sensitivity of 84.4% and a specificity of 99.1% and was not found in malignant melanomas or pigmented basal cell carcinomas. The positive predictive value was 93.1%, the negative predictive value was 97.8%, the intraobserver agreement was perfect (κ range, 0.83-1.00) (P < .001 for all).

Conclusion: Dermoscopy is helpful in improving the diagnostic accuracy of solitary angiokeratomas and allows the observer to differentiate them from other cutaneous tumors such as malignant melanomas and pigmented basal cell carcinomas.

Arch Dermatol. 2007;143:318-325

The term angiokeratoma was coined by Mibelli1 in 1889 and is derived from the 3 Greek words αγγείον, κερας, and ωμα, which mean “vessels,” “horn,” and “tumor,” respectively. Angiokeratomas are benign vascular lesions that histopathologically consist of dilated subepidermal vessels and, in most cases, are associated with an epithelial reaction that includes acanthosis or hyperkeratosis. They are seen clinically as solitary or multiple, red to black papules or plaques with a mamillated surface.2-4 The prevalence of angiokeratomas is estimated to be approximately 0.16% among the general population.5 Five clinical types are recognized, although there are reports describing other clinically atypical forms of angiokeratomas.2,6 These 5 clinical types are angiokeratoma of Mibelli2 (or angiokeratoma acroasphythecum digitorum), angiokeratoma of Fordyce6 (or angiokeratoma scroti), angiokeratoma corporis diffusum,7 angiokeratoma circumscriptum naeviforme,8 and solitary angiokeratoma,9 which is the lesion featured in this study.

Solitary angiokeratomas were first described by Imperial and Helwig9 in 1967.
They are the most common form of angiokeratomas, and the reported frequency varies from 70% to 83% of all angiokeratomas. Solitary angiokeratomas are seen clinically as a warty, keratotic, red-blue to black papule or nodule with a diameter of 2 to 10 mm. However, most lesions begin as bright, soft, nonkeratotic papules that grow larger and change to firm, blue-violaceous to black, keratotic papules. The clinical morphological structure and evolution of solitary angiokeratomas can be mistaken for others tumors. The most common differential diagnosis involves melanocytic nevi, Spitz-Reed nevi, malignant melanomas, pigmented basal cell carcinomas, seborrheic keratoses, dermatofibromas, and other vascular lesions such as hemangiomas or pyogenic granulomas.

Dermoscopy is a noninvasive in vivo technique that has revealed a new realm in the clinical morphological patterns of pigmented skin lesions. This technique allows for better visualization of structures within the epidermis, dermoepidermal junction, and superficial dermis. Previous studies demonstrated that the use of dermoscopy improves the clinical accuracy in diagnosing melanomas and other pigmented and vascular skin lesions and may help in differentiating benign from malignant lesions. The objectives of this study were to describe the dermoscopic characteristics of a series of solitary angiokeratomas and to investigate the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPP), and reproducibility of dermoscopic structures and patterns associated with solitary angiokeratomas.

**METHODS**

Dermoscopic images of 32 histopathologically proven specimens of solitary angiokeratomas, collected at pigmented lesion clinics in Spain, Italy, Argentina, New York City, and Austria, were evaluated for the presence of dermoscopic features. Dermoscopic images of each lesion were obtained using a digital microscopy system (DermLite Foto; 3Gen, LLC, Dana Point, Calif) with a lens at 10-fold magnification (Dermaphot; Heine Optotechnik, Herrsching, Germany). Clinical data were obtained for each patient, including age, sex, and anatomical location of the specimen. A list of 37 dermoscopic criteria based on the conclusions of the Consensus Net Meeting on Dermoscopy vascular structures described by Argenziano et al. and 21 dermoscopic descriptions of solitary angiokeratomas by various authors were evaluated by one of us (P.Z.). These criteria and their frequency among solitary angiokeratomas are given in Table 1. The dermoscopic structures found in at least 50% of the cases were used to formulate global patterns that were most commonly found in our specimens of solitary angiokeratomas.

In the second part of the study, dermoscopic images of 32 melanocytic nevi, 32 Spitz-Reed nevi, 32 malignant melanomas, 32 pigmented basal cell carcinomas, 32 dermatofibromas, 32 seborrheic keratoses, and 32 vascular lesion specimens (19 angiomas, 7 pyogenic granulomas, 3 spider nevi, 2 lymphangiomata, and 1 venous lake) were consecutively obtained from the dermatology departments of Hospital Sant Pau i Santa Tecla and Hospital Clinic of Barcelona. Dermoscopic images of each lesion were obtained using DermLite Foto mounted on a digital camera at 10-fold magnification. All nonangiokeratoma lesions were evaluated for the presence of the same dermoscopic structures and patterns commonly seen in angiokeratomas (Table 2).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequencies of Dermoscopic Criteria in Solitary Angiokeratomas*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melanocytic lesions</td>
<td>3% Pigmented network, 59% blue-whitish veil</td>
</tr>
<tr>
<td>Seborrheic keratoses</td>
<td>3% Milia-like cysts</td>
</tr>
<tr>
<td>Basal cell carcinomas</td>
<td>44% Ulceration</td>
</tr>
<tr>
<td>Vascular structures</td>
<td>3% Linear-irregular vessels, 19% milky-red areas, 69% erythema</td>
</tr>
<tr>
<td>Other criteria</td>
<td>53% Red lacunae, 94% dark lacunae</td>
</tr>
<tr>
<td></td>
<td>3% peripheral delicate pigment network, 47% scales, 91% whitish vein, 53% dark hemorrhagic crusts</td>
</tr>
</tbody>
</table>

*Additional dermoscopic criteria (all with 0% observed frequencies in the solitary angiokeratomas herein) for the variables are as follows: melanocytic lesions (pseudonetwork, dots, globules, streaks, blottches, hypopigmentation, and regression structures), seborrheic keratoses (exophytic papillary structures, fissures and ridges, comedolike openings, and fingerprint and cerebriform pattern), basal cell carcinomas (spoke-wheel areas, leaflike structures, arborizing vessels, large blue-gray ovoid nests, and multiple blue-gray globules), vascular structures (dotted vessels, comma vessels, hairpin vessels, polymorphous or atypical vessels, glomerular vessels, and crown vessels), and other (central whitelike patch).

On the basis of these evaluations, we determined the diagnostic significance of different dermoscopic structures and patterns associated with solitary angiokeratomas. The criteria for calculating diagnostic variables of each dermoscopic structure or pattern in solitary angiokeratomas were defined as follows: true-positive (TP) lesions were solitary angiokeratomas showing the dermoscopic structure or pattern being tested, true-negative (TN) lesions were nonsolitary angiokeratomas with the dermoscopic structure or pattern was not detected, false-negative (FN) lesions were solitary angiokeratomas not showing the dermoscopic structure or pattern being tested, and false-positive (FP) lesions were nonsolitary angiokeratomas that revealed the dermoscopic structure or pattern lesion was sensitivity was the fraction of solitary angiokeratoma lesions showing the dermoscopic structure or pattern under investigation among all solitary angiokeratoma lesions and was calculated as TP/(TP+FN). Specificity was the fraction of lesions other than solitary angiokeratomas not showing the dermoscopic structure or pattern among all lesions was calculated as TN/(TN+FP). The PPV was the fraction of solitary angiokeratoma lesions showing the dermoscopic structure or pattern among all lesions with that dermoscopic structure or pattern and was calculated as TP/(TP+FP). The NPP was the fraction of nonsolitary angiokeratoma lesions not showing the dermoscopic structure or pattern among all lesions without that dermoscopic structure or pattern and was calculated as TN/(TN+FN). Data analysis was performed using SPSS Inc. software version 10.0 for data management, giving 2×2 contingency tables, and the differences were calculated using the χ2 or Fisher exact test.

All lesions in this study were evaluated for the presence of dermoscopic structures and patterns by one of us (P.Z.). The interobserver and intraobserver reproducibility was assessed for each dermoscopic structure and pattern evaluated for 35 lesions, which were randomly selected from 256 tumors included in the study. Regarding interobserver reproducibility, one of us (P.Z.) evaluated each structure and pattern and reevaluated them 3 months later. Regarding interobserver reproducibility, 2 of us (D.M.-R. and A.L.) evaluated the same lesions as those evaluated by P.Z., and the results were compared. Data analysis was performed using...
Table 2. Frequencies of the Dermoscopic Structures and Patterns in Solitary Angiokeratomas and Other Cutaneous Tumors*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Red Lacunae</th>
<th>Dark Lacunae</th>
<th>Hemorrhagic Crusts</th>
<th>Whitish Veil</th>
<th>Erythema</th>
<th>Peripheral Erythema</th>
<th>Pattern 1</th>
<th>Pattern 2</th>
<th>Pattern 3</th>
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<tr>
<td>Solitary angiokeratomas</td>
<td>53</td>
<td>94</td>
<td>53</td>
<td>91</td>
<td>69</td>
<td>53</td>
<td>84</td>
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<td>0</td>
<td>75</td>
<td>41</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>25</td>
<td>50</td>
<td>56</td>
<td>31</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Seborrheic keratoses</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>31</td>
<td>16</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Dermatofibromas</td>
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<td>0</td>
<td>0</td>
<td>16</td>
<td>34</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Melanocytic nevi</td>
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<td>0</td>
<td>0</td>
<td>16</td>
<td>6</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>Spitz-Reed nevi</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>22</td>
<td>22</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Other vascular lesions</td>
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<td>6</td>
<td>6</td>
<td>47</td>
<td>44</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

*Data are given as percentages.

Figure 1. Dermoscopic structures of solitary angiokeratomas, located on the left leg of a 28-year-old man (A), the right leg of a 27-year-old man (B), the trunk of a 55-year-old man (C), and the trunk of a 39-year-old woman (D). Dark lacunae (a) are sharply ovoid or round dark blue, dark violaceous, or black structures that correspond histopathologically to dilated vascular spaces located in the upper to middle dermis and that can be partially or completely thrombosed. Red lacunae (b) demonstrate the same dermoscopic feature as in (a) but are red or red-blue instead of black. Whitish veil (c) comprises an ill-defined structureless area with an overlying whitish “ground-glass” film that corresponds to hyperkeratosis and acanthosis. Hemorrhagic crusts (d) correspond to areas of bleeding. Peripheral erythema (e) manifests as a pinkish homogeneous area that could represent an inflamed lesion.

SPSS software version 10.0, which calculated \( \kappa \) statistics with approximate significance. With regard to the interpretation of \( \kappa \) statistics, a value of 1.00 indicates perfect agreement, values greater than 0.80 are considered excellent, values between 0.61 and 0.80 are good, values between 0.40 and 0.60 are fair, and values less than 0.40 are poor.

The study protocol was approved by the Local Research Ethics Committee of the Hospital Universitari de Sant Joan Facultiy of Medicine, Reus, Spain. All participants gave oral informed consent.

RESULTS

Thirty-two solitary angiokeratomas were obtained. The lesions were obtained from 19 women (59%) and 13 men...
(41%) ranging in age from 15 to 84 years (median age, 49.6 years). Nineteen (59%) of 32 lesions were on the trunk, 9 (28%) were on the lower extremities, 3 (9%) were on the upper extremities, and 1 (3%) was on the face.

The following 6 dermoscopic structures were consistently seen in at least 50% of the solitary angiokeratomas (Table 2): dark lacunae (94%), whitish veil (91%), erythema (69%), peripheral erythema (53%), red lacunae (53%), and hemorrhagic crusts (53%) (Figures 1, 2, 3, 4, 5, and 6). When initially seen, none of the solitary angiokeratomas met the criteria for melanocytic lesions. However, 1 lesion showed a peripheral delicate pigment network similar to that seen in dermatofibromas (Figure 5). We evaluated the following 3 dermoscopic patterns: pattern 1 (dark lacunae and whitish veil), pattern 2 (dark lacunae, whitish veil, and peripheral erythema), and pattern 3 (dark lacunae, whitish veil, and hemorrhagic crusts) (Figure 7). Pattern 1 was present in 84% of solitary angiokeratomas, pattern 2 in 44%, and pattern 3 in 53% (Table 2). These patterns are not mutually exclusive.

Concerning other cutaneous tumors (Table 2), dark lacunae were observed in 6% of other vascular lesions, including 1 thrombosed angioma and 1 fibrosed angioma. They were not observed in any of the other tumors, including malignant melanomas and pigmented basal cell carcinomas. Whitish veil, erythema, and peripheral erythema were observed with relative frequency in other cutaneous tumors. Red lacunae were seen in 59% of other vascular lesions. Hemorrhagic crusts were observed in 25% of pigmented basal cell carcinomas, in 9% of seborrheic keratoses, and in 6% of other vascular lesions. Dermoscopic patterns 1 and 3 were observed in 6% and 3% of other vascular lesions, respectively. Pattern 2 was not observed in other cutaneous tumors.

Table 3 summarizes the results of the statistical analysis. These include the sensitivity, specificity, PPV, NPP, intraobserver agreement, and interobserver agreement (concordance between observers 1 and 2 and concordance between observers 1 and 3) for solitary angiokeratomas.

Dark lacunae exhibited a sensitivity of 93.8% and a specificity of 99.1%, with specificities of 100.0% compared with the 2 malignant tumors (malignant melanomas and pigmented basal cell carcinomas) (P<.001 for all) (Table 3). Dark lacunae showed a PPV of 93.8% and an NPP of 99.1% (P<.001 for both). Dark lacunae had perfect intraobserver agreement (κ, 1.00) and excellent to perfect interobserver agreement (κ range, 0.83-1.00) (P<.001 for both).

Figure 2. Pigmented skin lesion on the left leg of an 18-year-old woman. A, The clinical diagnosis was malignant melanoma. B, In the dermoscopic image, dark lacunae and whitish veil were observed. C, The histopathologic examination findings revealed a solitary angiokeratoma (hematoxylin-eosin, original magnification ×10).
Red lacunae showed a high specificity (91.5%) but a low sensitivity (53.1%) (P < .001 for both), as they were frequently seen in other vascular lesions (Table 3). We observed a predominance of red lacunae in early solitary angiokeratomas (Figure 6). Red lacunae were not found in malignant melanomas or pigmented basal cell carcinomas. The NPV of red lacunae was 93.2% (P < .001) (Table 3). The intraobserver agreement was perfect (κ, 1.00), and the interobserver agreement was excellent to perfect (κ range, 0.80-1.00) (P < .001 for both).

Whitish veil exhibited excellent sensitivity (90.6%) but low specificity (63.4%) (P < .001 for both) (Table 3). Moreover, it was a common dermoscopic feature of malignant melanomas and pigmented basal cell carcinomas. The PPV was low (26.1%), but the NPV was high (97.9%) (P < .001 for both). The intraobserver agreement was excellent (κ, 0.94), and the interobserver agreement was good (κ range, 0.65-0.69) (P < .001 for both).

The high specificity of hemorrhagic crusts (94.2%, P < .001) is noteworthy (Table 3). However, these were
found in 25% of pigmented basal cell carcinomas and, in our experience, could be present in some malignant melanomas, although this was not reflected in the study. The high specificity of peripheral erythema (90.2%, \( P < .001 \)) in the study was notable, although it was also observed in some malignant melanomas and pigmented basal cell carcinomas.

Pattern 1 exhibited a higher sensitivity (84.4%) compared with the other patterns, whereas pattern 2 showed a specificity of 100.0% (\( P < .001 \) for both) (Table 3). None of the 3 patterns seen in solitary angiokeratomas were found in malignant melanomas or pigmented basal cell carcinomas. Pattern 2 exhibited a PPV of 100.0%, and pattern 1 had the highest NPV (97.8%) (\( P < .001 \) for both). The intraobserver agreement for all 3 patterns was perfect (\( \kappa \), 1.00), and the interobserver agreement was excellent to perfect for pattern 1 (\( \kappa \) range, 0.83-1.00) and good to excellent for the other patterns (\( \kappa \) range, 0.65-0.94) (\( P < .001 \) for all).

In 1967, Imperial and Helwig performed a retrospective analysis of 116 tissue samples diagnosed as angiokeratomas between 1942 and 1963 and identified the “solitary or multiple angiokeratoma” as the fifth variety of angiokeratoma. It was subsequently determined that solitary angiokeratomas were the most common type, representing 70% to 83% of all angiokeratomas. Although solitary angiokeratomas can be seen in individuals of any age and sex, it seems to be most frequent in men in the second through fourth decades of life. Solitary angiokeratomas may appear at any anatomical site, but they favor the lower extremities. The pathogenesis of solitary angiokeratomas is unknown but is believed to be related to external trauma. The lesions tend to be asymptomatic; however, 14% of patients complain of mild to moderate pain. Intermittent bleeding following irritation or trauma has been reported to occur in as many as one fourth of the cases. The morphological structure and evolution of solitary angiokeratomas often raises the physician’s concern for malignancy because of its sudden enlargement, darkening, and intermittent bleeding. Angiokeratomas are often diagnosed as melanocytic nevi, Spitz-Reed nevi, malignant melanomas, pigmented basal cell carcinomas, seborrheic keratoses, dermatofibromas, or other vascular lesions such as hemangiomas or pyogenic granulomas. In the retrospective study by Imperial and Helwig, 3% of solitary angiokeratomas were correctly diagnosed by the examining physician. Furthermore, 15% of solitary angiokeratomas in the study by Imperial and Helwig and 20% of angiokeratomas in the study by Naranjo Sintes et al were diagnosed clinically as melanomas.

Dermoscopy is a noninvasive in vivo method for the diagnosis of pigmented and nonpigmented skin lesions. There has been extensive investigation in the realm of melanocytic lesions (especially malignant melanomas) and other pigmented skin lesions (such as pigmented basal cell carcinomas, seborrheic keratoses, and dermatofibromas). However, there are surprisingly few reports regarding the dermoscopic features of vascular lesions such as angiokeratomas given the fact that these lesions may sometimes be difficult to differentiate from malignant melanomas. This could be the case with solitary angiokeratomas. To the best of our knowledge, only a few dermoscopic findings, such as black lacunae, have been described by some authors. We are aware of no previous studies on the dermoscopic characteristics of this tumor.

The results of this multicentric study reveal that 6 dermoscopic structures were evident in at least 50% of the solitary angiokeratomas and included dark lacunae, whitish veil, erythema, peripheral erythema, red lacunae, and hemorrhagic crusts. Red lacunae were defined as sharply ovoid or round red or red-blue structures that correspond histopathologically to wide and dilated vascular spaces located in the upper or middle dermis. Dark lacunae represent dilated vascular spaces in the upper dermis, and their dark violaceous, dark blue, or black color corresponds to vascular spaces that are partially or completely thrombosed. Whitish veil refers to an ill-defined structureless area with an overlying whitish “ground-
The other dermoscopic structures observed in angiokeratomas and represent the most valuable criterion for correctly diagnosing this vascular tumor. The sensitivity and specificity for dark lacunae were 93.8% and 99.1%, respectively (Table 3). Only 2 vascular lesions were initially seen with dark lacunae, 1 thrombosed angioma and 1 fibrosed long-standing angioma. No malignant melanomas or pigmented basal cell carcinomas were initially seen with dark lacunae, 1 thrombosed angioma and 1 fibrosed long-standing angioma. No malignant melanomas or pigmented basal cell carcinomas were seen in other vascular lesions such as angiomas. We observed a predominance of red lacunae in early solitary angiokeratomas (Figure 6). Hemorrhagic crusts, erythema, and peripheral erythema showed low sensitivity and specificity, and they were commonly seen in malignant melanomas and pigmented basal cell carcinomas.

Pattern 1, consisting of dark lacunae and whitish veil, was determined to be the most consistent pattern observed in solitary angiokeratomas; however, the presence of dark lacunae alone was a better variable for diagnosing angiokeratomas. Pattern 1 exhibited a sensitivity of 84.4%, PPV of 93.1%, NPV of 97.8%, and specificity of 99.1% (Table 3). Pattern 1 showed excellent to perfect intraobserver and interobserver agreement. Pattern 2 (dark lacunae, whitish veil, and peripheral erythema) had a specificity of 100.0% for solitary angiokeratomas and exhibited a PPV of 100.0%.

In conclusion, the dermoscopic structures known as dark lacunae as well as pattern 1, consisting of dark lacunae and whitish veil, demonstrated high sensitivity, specificity, PPV, NPV, and reproducibility. The present study confirms that dermoscopy is a helpful tool that may increase the physician’s diagnostic accuracy of solitary angiokeratomas and allows the observer to differentiate them from other cutaneous tumors, including malignant melanomas and pigmented basal cell carcinomas.

Accepted for Publication: June 1, 2006.

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### Table 3. Diagnostic Significance and Reproducibility of Dermoscopic Structures and Patterns in Solitary Angiokeratomas*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive Predictive Value</th>
<th>Negative Predictive Value</th>
<th>k Interobserver Agreement</th>
<th>k1 Interobserver Agreement</th>
<th>k2 Interobserver Agreement</th>
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<tbody>
<tr>
<td>Red lacunae</td>
<td>53.1</td>
<td>91.5</td>
<td>47.2</td>
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<td>1.00</td>
<td>0.80</td>
<td>1.00</td>
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<tr>
<td>Dark lacunae</td>
<td>93.8</td>
<td>99.1</td>
<td>93.8</td>
<td>99.1</td>
<td>1.00</td>
<td>1.00</td>
<td>0.83</td>
</tr>
<tr>
<td>Hemorrhagic crusts</td>
<td>93.8</td>
<td>99.1</td>
<td>25.0†</td>
<td>50.0†</td>
<td>6.1</td>
<td>26.1</td>
<td>97.9</td>
</tr>
<tr>
<td>Whitish veil</td>
<td>68.8</td>
<td>68.8</td>
<td>43.6§</td>
<td>93.1</td>
<td>1.00</td>
<td>0.37</td>
<td>0.94</td>
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<td>Erythema</td>
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<td>99.1</td>
<td>84.4</td>
<td>97.8</td>
<td>1.00</td>
<td>0.80</td>
<td>1.00</td>
</tr>
<tr>
<td>Peripheral erythema</td>
<td>53.1</td>
<td>99.1</td>
<td>84.4</td>
<td>97.8</td>
<td>1.00</td>
<td>0.80</td>
<td>1.00</td>
</tr>
<tr>
<td>Pattern 1</td>
<td>84.4</td>
<td>99.1</td>
<td>93.1</td>
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<td>0.80</td>
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<tr>
<td>Pattern 2</td>
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<td>99.1</td>
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<tr>
<td>Pattern 3</td>
<td>53.1</td>
<td>99.1</td>
<td>94.4</td>
<td>93.7</td>
<td>1.00</td>
<td>0.80</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Abbreviations: *1, between P.Z. and A.L.; *2, between P.Z. and D.M.-R.

* P < .001 for all comparisons unless otherwise indicated.
† P = .02.
‡ P = .09.
§ P = .22.
|| P = .002.
¶ P = .06.
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Author Contributions:

Study concept and design: Zaballos, Puig, and Malvehy. Acquisition of data: Zaballos, Puig, Argenziano, Moreno-Ramírez, Cabo, Marghoob, Llambrich, Zalaudek, and Malvehy. Analysis and interpretation of data: Zaballos, Daufí, Puig, Marghoob, and Malvehy. Drafting of the manuscript: Zaballos and Zalaudek. Critical revision of the manuscript for important intellectual content: Zaballos, Daufí, Puig, Argenziano, Moreno-Ramírez, Cabo, Marghoob, and Llambrich. Statistical analysis: Zaballos. Administrative, technical, and material support: Zaballos and Zalaudek. Study supervision: Zaballos, Daufí, Argenziano, Cabo, and Llambrich. Clinical participant: Moreno-Ramírez.

Financial Disclosure: None reported.

REFERENCES