Case Report

Analytic Dermoscopy of Superficial Basal Cell Carcinoma

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Abstract Dermoscopy is a noninvasive optical surface microscopy useful for diagnostic purposes in a number of skin conditions including basal cell carcinoma (BCC). To use analytic dermoscopy to compare the size and shape of dermoscopic structures in pigmented and nonpigmented BCCs. Image analysis using the Photoshop® software and morphometry were combined for highlighting the outlines of dermoscopic aspects in BCCs. The spoke-wheel structures were conveniently highlighted by the present method. They appeared larger in the pigmented BCC phenotype than in nonpigmented BCCs. The present method allows quantification of cauliflower-like structures (spoke-wheel and petal areas) using morphometric analysis. The procedure is applicable for identifying the therapeutic effects. The present analytical method was never used so far. It goes beyond descriptive dermoscopy and improves the accuracy of the findings. The procedure opens new horizons in quantitative objective dermoscopy.

Keywords dermoscopy; basal cell carcinoma; analytic method; skin cancer; image analysis

1. Introduction

Dermoscopy is a descriptive optical noninvasive method corresponding to surface microscopy. It improves the diagnostic accuracy of some skin cancers [14,21]. There is a need for improving the accuracy of the observations through the development of analytical methods based on objective quantifications. Such procedures would likely be suited for scientific and experimental purposes as well as for routine clinical management [4], particularly when assessing the effects of therapies.

Basal cell carcinoma (BCC) is a common neoplasm exhibiting a combination pattern of focal growth and regression [5,10]. Observational dermoscopy improves the clinical diagnostic accuracy of BCCs [11,14,17,18,19,21,23,24,27]. A two-step procedure is helpful for diagnostic purpose of BCCs, particularly in their pigmented variant. In a first step, the melanocytic tumor criteria must be ruled out. In a second step, specific features for BCC should be present, including gray-blue globules and larger ovoid nests, spoke-wheel structures, leaf-like areas, erosions, blue-whitish veil, and arborizing treelike telangiectasias. Improving the picture resolution is likely to improve the diagnostic accuracy, particularly in small-sized lesions. The effect of treatments should be better appreciated after quantifying some typical dermoscopic features.

The aim of the present study was to introduce a new procedure allowing objective dermoscopy quantifications using computerized morphometry in superficial pigmented and nonpigmented BCCs.

2. Materials and method

This retrospective study used dermoscopic records of 27 superficial nonpigmented BCCs and 23 superficial pigmented BCCs present on the trunk of patients aged 67 ± 4 years. The device was a handheld Dermaphot® Heine 20 (Heine Optotechnik, Herrsching, Germany). The pictures were stored in a computer equipped with the Photoshop® software allowing automatic enhancement of the margins of dermoscopic structures. Digital image analysis (MOP-Videoplan® Kontron, Eching, Germany) was performed after projection of the dermoscopic patterns onto the digitizer tablet of the image analyzer. A stylus was used for computation of selected dermoscopic structures. The working magnification was ×40. Areas of dermoscopic objects were determined. Each cauliflower-like structure was further defined by the average diameter, representing the diameter of an equivalent circle for the measured area. For each structure, the form factor (Form AR) was computed. It represented four areas divided by \( \pi \times \text{max diameter} \times \text{min diameter} \). This parameter defined the irregularity of the contours of the examined structures. The maximum value is 1, and it reflects a smooth structure like a circle or an ellipse. The value decreases toward 0 as the outline of the structure is increasingly indented or corrugated.
Table 1: Shape and size of cauliflower-like dermoscopy structures in 4/27 superficial nonpigmented BCC and 9/23 superficial pigmented BCC.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Superficial nonpigmented BCC</th>
<th>Superficial pigmented BCC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Range</td>
</tr>
<tr>
<td>Form AR</td>
<td>0.78</td>
<td>0.54–0.96</td>
</tr>
<tr>
<td>Area (mm²)</td>
<td>0.53</td>
<td>0.01–4.23</td>
</tr>
<tr>
<td>Average diameter (mm)</td>
<td>0.82</td>
<td>0.08–2.32</td>
</tr>
</tbody>
</table>

NS: not significant.

Due to some skewness in data, medians and ranges were determined. Data were statistically assessed using the Mann-Whitney U test. A $P$-value lower than 0.05 was considered statistically significant.

3. Results

A precise clinical description of each case was recorded in order to allow an accurate handling of the pictures and selection of relevant structures. The princeps case is reported below as an example of the findings.

4. Case report

A 69-year-old woman initially presented with Darier-White disease. She was treated with acitretin for several years. At clinical examination, a crusty pigmented lesion was noticed on the upper back (Figures 1(a) and 1(b)), possibly suggesting a superficial BCC. In addition to this lesion, some actinic lentigines were observed. The dermoscopic examination of the BCC showed numerous tiny crusts of similar sizes and shapes (Figure 2(a)) corresponding to discrete erosions. Most of them were present on radial pigmented streaks looking like thin spoke-wheel structures mainly confined to the periphery of the lesion. Some of the thicker spoke-wheel structures somewhat resembled “flower petals.” In addition, maple leaf-like structures were focally present. Only the tumoral aggregates were heavily melanized. Between the melanized structures, a pale pink background contained a few blue-whitish areas evoking tumoral regression. A well circumscribed honeycomb network typical for actinic lentigo was abutted to the BCC forming a collision tumor. The dermoscopic diagnosis of pigmented superficial BCC was confirmed by histopathology.

5. Morphometry of the BCC case series

The outlines of dermoscopic features were automatically highlighted using the Photoshop® software. This procedure allowed to better distinguish some dermoscopic structures described above (Figure 2(b)). The pattern of BCC structures distinctly showed a number of concentric objects, some of which were serrated and exhibited a cauliflower-like shape while others were more rounded.

After contrasting the images, cauliflower-like structures were recognized on 26% (13/50) BCC. Data are presented in Table 1. No difference in Form AR was found between the spoke-wheel and flower petals structures between the pigmented and nonpigmented types of BCC. By contrast the areas and average diameter of the same structures were larger ($P < .05$) in superficial pigmented BCCs compared to the nonpigmented type.

6. Discussion

Although dermoscopy has reached an established status for both the diagnosis and management of patients with pigmented and nonpigmented skin tumors [21], there is still need and place for further research in this field [27]. Indeed, dermoscopy is helpful for diagnosing pigmented neoplasms,
for which a regular visual inspection is associated with a restricted sensitivity and specificity [19]. Though they are not the most frequent, the specific BCC dermoscopic patterns include the maple leaf-structures and the spoke-wheel areas [17]. Some dermoscopic structures are correlated with the BCC type, bringing further help to the diagnosis of non-pigmented neoplasms. Arborizing “treelike” vessels are typically found in nodular BCC, whereas thin and short vessels are more often present in superficial BCC. Whitish to reddish shiny areas, as well as small multiple erosions were described in association with superficial BCC [9,11].

A few other dermoscopic patterns were recently described. Concentric structures that are rounder than spoke-wheel areas, lack the characteristic peripheral radial projections. In addition, rosettes [15], multiple gray-blue dots [1,9], radial streaking [2], petal-like thickened spoke-wheel areas [13], and a prominent erythematous background [20] were reported. Rarely the simultaneous presence of a pigmentary network and a BCC suggests an associated actinic lentigo, a nevus or a more specific location of the BCC on sun-damaged skin [12].

Some other attempts at objective assessments of BCC dermoscopic features were initiated in a recent past [6,7]. The present study focused on some of the most typical dermoscopic BCC features, namely the spoke-wheel areas. There was a wide range of variation in their sizes and shapes. The values at a given time point of each BCC probably corresponded to a moment in the kinetics of evolution of the neoplasm.

Some correlations were reported between the dermoscopic structures and histopathological features of BCC [3,8,16,22,25,26]. The spoke-wheel areas considered in the present study correspond to superficial BCC nests exhibiting radial extensions. These structures are representative of the extension progress of clusters of malignant cells. The present findings suggest that the pigmented phenotype of superficial BCC exhibit a higher tendency for superficial spreading compared to the nonpigmented type.

In sum, the recognition of typical dermoscopy patterns including spoke-wheel areas helps diagnosing particular pigmented BCC, which clinical identification possibly remain uncertain at the regular clinical examination only. Relevant measurements of specific dermoscopic structures are dependent upon careful thought being given to the collection of pictures. The margin enhancement used in this study reveals clear-cut structures relevant to the progression of the neoplasm.

Competing interests The authors declare that they have no competing interests that are directly relevant to the content of this manuscript.

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