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A case of a superficial spreading melanoma in situ diagnosed via digital dermoscopic monitoring with high dynamic range conversion

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ABSTRACT

A 48-year-old woman presented with a 3 mm, pigmented macule at her first visit to our clinic. The macule, which showed complete symmetry and a typical network, was tentatively diagnosed as a Clark nevus; a 6-month follow-up was recommended, and the patient returned 7 months later. At the second visit, the lesion had enlarged to a diameter of 5 mm, and dermoscopy revealed that it had maintained its typical pigment network. At this point, evidence-based monitoring would have led to excision but the decision was made to continue monitoring. Owing to poor compliance, the patient went another 2 years without follow-up. When we assess small lesions, such as this, the usefulness of dermoscopy is apparent. Additionally, we examined the benefits and drawbacks of high dynamic range (HDR) conversion of the dermoscopy images and their helpfulness for inspecting small lesions. Although the delicate structures present in the lesion can be recognized by a dermoscopy expert and HDR image conversion has a capacity to highlight important structures, there is also a risk that HDR image conversion may mask some of the structural changes. However, a comparison of the original dermoscopy images with the HDR-converted images provides newly trained dermoscopists the opportunity to recognize new findings and to distinguish the differences in the findings between both the types of images. Therefore, such comparisons might be useful for obtaining an accurate diagnosis by using dermoscopy and HDR image conversion.

Introduction

Short- to medium-term (i.e., 3–6 months) digital dermoscopic monitoring is recommended for the early detection of featureless melanomas [1-3]. High dynamic range (HDR) conversion of dermoscopic images is useful for the identification of dermoscopic structures, even by newly trained dermoscopists [4].

Case report

A 48-year-old Japanese woman presented with a 6-month history of a pigmented macule on her left chest. Her family history was unremarkable, but her medical history indicated the excision of a facial basal cell carcinoma 3 years earlier. A physical examination during the initial visit showed a flat, pigmented 3 mm macule on the patient's left chest. Dermoscopy revealed a typical pigment network at the periphery, with structureless, dark-brown pigmentation in the center (Figure 1A). HDR conversion of the dermoscopic image showed the pigment network more clearly (Figure 1B). The lesion demonstrated complete symmetry in both color and structure, but was darker in the center and paler at the periphery. Therefore, the macule was tentatively diagnosed as a Clark nevus, and a 6-month follow-up was recommended. When the patient presented 7 months later, the lesion had enlarged to 5 mm diameter. Dermoscopic examination of the lesion revealed that it still had a typical pigment network at the periphery as well as structureless, dark-brown, central pigmentation (Figure 2A). HDR conversion of the dermoscopy image also showed the entire pigment network (Figure 2B). There were no obvious findings suggestive of a melanoma apart from the fact that the lesion had more than doubled in size. This would have lead to excision according to evidence based guidelines for short-term monitoring, but in fact a decision was made to continue monitoring for a further 6 months. However, the patient did not present for a follow-up examination for 2 years. At the time of her third clinical visit, the patient's lesion had further enlarged to 7 mm in diameter (Figure 3A-C). Dermoscopy revealed an atypical pigment network with multifocal thickening of the mesh, color asymmetry, and the presence of bluish-white structures. The HDR conversion continued to reveal the entire pigment network,

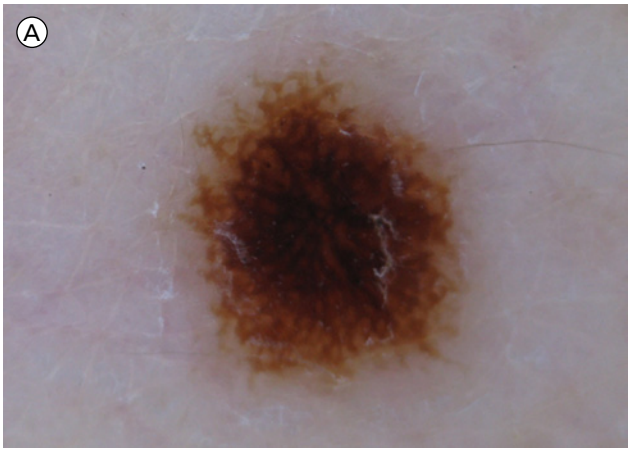

Figure 1A. A dermoscopic image obtained during the initial presentation, showing a typical pigment network at the lesion's periphery and structureless dark-brown pigmentation in the center, with a diameter of 3 mm. (Copyright: ©2014 Sato et al.)

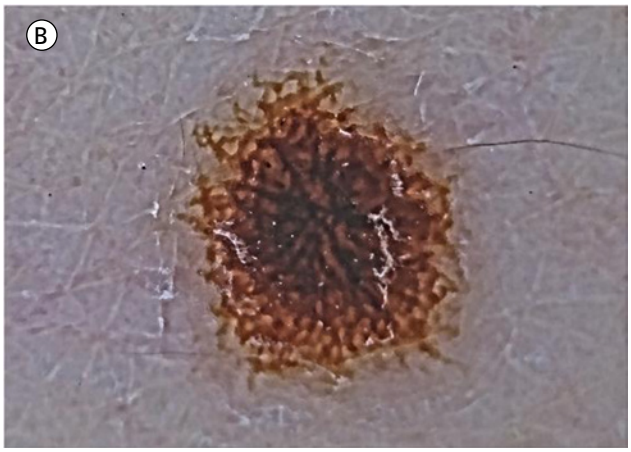

Figure 1B. A dermoscopic image with high dynamic range conversion clearly showing the entire pigment network. The lesion showed complete symmetry in both color and structure. (Copyright: ©2014 Sato et al.)

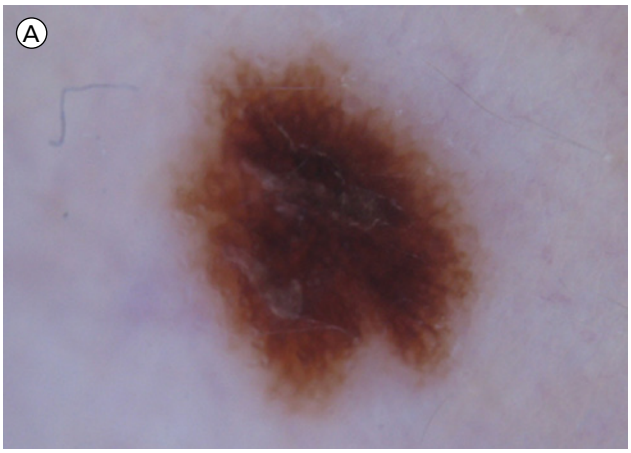

Figure 2A. A dermoscopic image obtained during the second presentation (7 months after the first image) showing the typical pigment network of the lesion, with a 5 mm diameter. Despite the slight increase in lesion diameter, the overall reticular pattern of the lesion did not change. (Copyright: ©2014 Sato et al.)

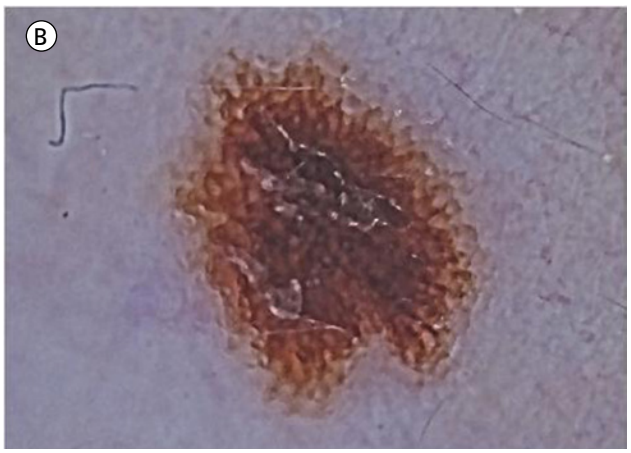

Figure 2B. A dermoscopic image with high dynamic range conversion clearly showing the entire pigment network. (Copyright: ©2014 Sato et al.)

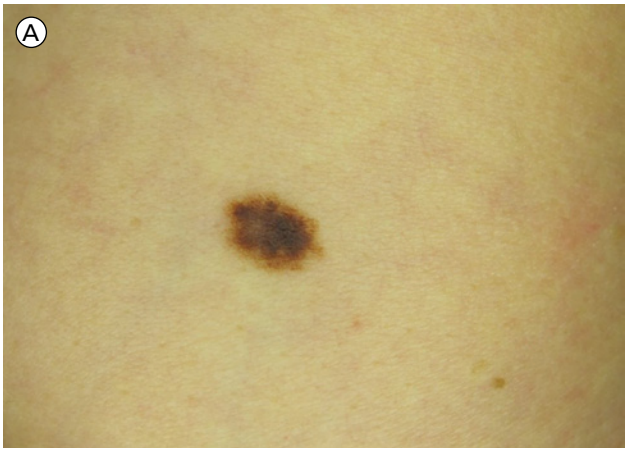

Figure 3A. A clinical image obtained during the third presentation (30 months after the first presentation) showing a 7 mm diameter lesion. (Copyright: ©2014 Sato et al.)

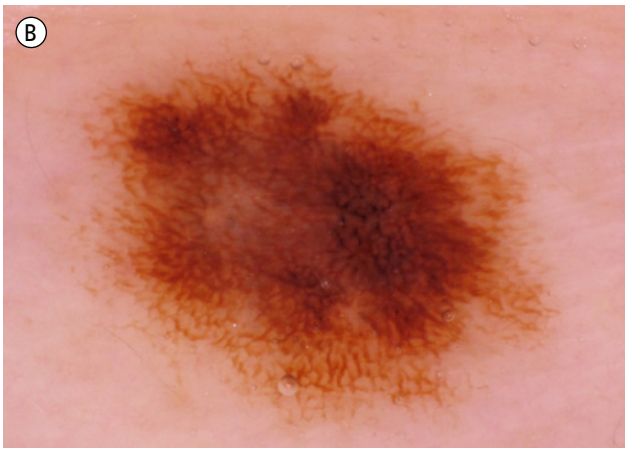

Figure 3B. A dermoscopic image showing the atypical pigment network with multifocal thickening of the mesh, color asymmetry, and the presence of bluish-white structures. (Copyright: ©2014 Sato et al.)

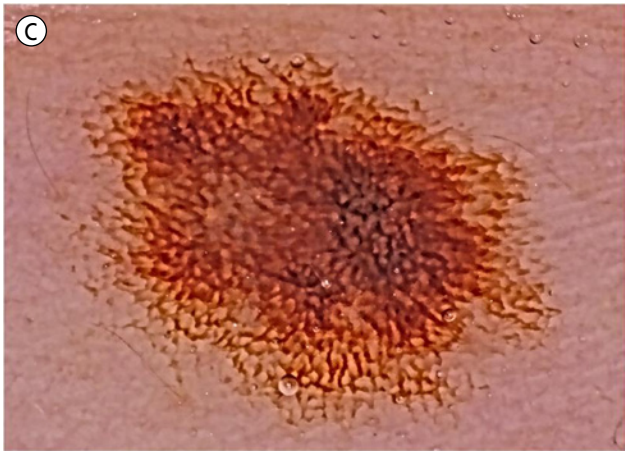

Figure 3C. A dermoscopic image with high dynamic range conversion clearly showing the entire pigment network with multifocal darkening and thickening of the network. (Copyright: ©2014 Sato et al.)

but demonstrated multifocal darkening and thickening of the mesh on this occasion. These findings were highly suggestive of a melanoma, and the patient was advised to undergo a complete excision of the lesion. The patient was referred to the Department of Dermatology, Tokyo Women's Medical University Medical Center East, Tokyo, Japan for further assessment. The lesion was excised with a 3 mm margin, and a histological diagnosis of an in situ superficial spreading melanoma was established.

Discussion

When dermoscopy reveals a melanocytic lesion with a multicomponent pattern, it should be considered highly suggestive of melanoma. However, early-onset melanoma lesions often show only a reticular pattern, and an evaluation for the presence of a typical or atypical pigment network is sometimes difficult. When an initial diagnosis, at the first visit, is difficult, short-term (3- to 6-month) monitoring is recommended [1-3]. Newly trained dermoscopists often find it difficult to identify structures revealed via dermoscopic examination, and HDR conversion of the images may be an effective method to facilitate identification of the structures [4]. HDR [5] is a set of methods used in imaging and photography to capture a greater dynamic range between the lightest and darkest areas of an image than permitted by standard digital imaging or photographic methods. HDR images can more accurately represent the range of intensity levels found in regular images, and are often captured by using a plurality of differently exposed pictures of the same subject matter. Non-HDR cameras take pictures at a single exposure level within a limited contrast range. This results in the loss of detail in bright or dark areas of pictures at different exposure levels. However, intelligently placing these images together produces a picture that is representative of both the dark and bright areas. To avoid taking multiple pictures at different exposure levels, the use of HDR image conversion software (Casio Computers, Tokyo, Japan) is required. In the present case, dermoscopy at the first and second presentations did not reveal any suspicious findings apart from the increase in lesion size, therefore, short-term follow-up was recommended. Evident thickening of the central network via dermoscopic examination at the patient's second presentation may have been detected if a consultation occurred with a doctor who was an expert in dermoscopy. Such a diagnosis may have led to excision of the lesion even though it was still symmetrical. At that time, there were two unequivocal reasons for excision, including the lesion having doubled in area by more than twice its original size and the pattern changes that were observed with thick, reticular lines being a clue to its malignancy. Departures from evidence-based protocols must not be permitted during monitoring. Kittler and Menzies reported that identification of any morphologic changes seen after 3 months as well as the utility of sequen-

tial imaging depends on patient compliance with follow-up visits [6]. For the present patient, lesion excision should have been recommended at the second visit, according to the evidence-based protocol, because of the lesion's enlargement, regardless of the absence of color or structure changes. However, erroneously, a 2 mm change in diameter (from 3 mm to 5 mm) was not considered a significant change. Therefore, the use of a ruler with 0.1 mm units to measure the length of lesion may have been useful to determine the exact change in the diameter. The change of 1.7 times the diameter (from 3 mm to 5 mm) of the lesion resulted in an increase of 2.8 times the area (from 28.3 mm^2 to 78.5 mm^2). Because of attention only to the structures and colors observed by using dermoscopy, our mistake resulted in a departure from the protocol. Further, when the appointment time had passed, it would have been prudent to have a protocol in place to actively contact the patient to return for a further examination. This case demonstrates the difficulty associated with prejudging a patient's likely compliance. The patient failed to present for her third planned visit, but presented two years later, when the lesion showed suspicious dermoscopic features, including an atypical pigment network and bluish-white structures. When we compared the dermoscopic images obtained during the 3 visits, the first 2 images showed that the network was already thickened and partly obscured, although the distribution of the color and structures was regular. A comparison of the diameters of the hypopigmented areas and the thickness of the pigmented mesh might be important. An abrupt change in color in the pigmented network might also suggest an atypical pigment network. Further accumulation of cases of early superficial spreading melanoma is needed to investigate the typical width of the pigment network although an objective definition such as given in Revised Pattern Analysis "lines reticular where the lines are thicker than the holes they surround" may prove to be appropriate [7]. The present case illustrates the application of HDR conversion to clearly identify the pigment network, even in a structureless area, by using ordinary dermoscopy. The use of reference HDR images, even by dermoscopy beginners, enabled changes in a lesion to be noticed along with new findings, such as the visibility of the structureless area and the thickening of the line demarcating the pigment network. On the other hand, HDR converted images strongly increase image contrast. Therefore, such changes may also obliterate valuable clues pertaining to the thickened network that make the holes in the network stand out in contrast to the lines. For newly trained dermoscopists, comparing the HDR-converted dermoscopy images with the original dermoscopy images is important. We must diagnose the lesions in a comprehensive manner via different methods, including examinations, dermoscopy images, and HDR-converted dermoscopy images.

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