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Balloon cell melanoma: a case report with polarized and non-polarized dermatoscopy and dermatopathology

James Maher[1], Alan Cameron[2], Sharon Wallace[3], Rafael Acosta-Rojas[4], David Weedon[5], Cliff Rosendahl[2]

1 Australian Skin Face Body, Ballarat, Australia
2 School of Medicine, The University of Queensland, Australia
3 St John of God Pathology, Ballarat, Australia
4 Deakin University, Geelong, Australia
5 Sullivan Nicolaides Pathology, Brisbane, Australia

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Corresponding author: Cliff Rosendahl, MBBS, Ph.D., PO Box 734, Capalaba, QLD 4157, Australia. Tel. +61 7 3245 3011; Fax. +61 7 3245 3022. Email: cliffrosendahl@bigpond.com

ABSTRACT

Balloon cell melanoma is a rare melanoma subtype, with only one previous case with dermatoscopy published. It is often non-pigmented, leading to diagnostic difficulty, and there is a tendency for lesions to be thick at diagnosis.

We report a case of balloon cell melanoma on the forearm of a 61-year-old man with both polarized and non-polarized dermatoscopy and dermatopathology. It presented as a firm pale nodule with focal eccentric pigmentation. The clinical images evoke a differential diagnosis of dermatofibroma, dermal nevus, Spitz nevus and basal cell carcinoma as well as melanoma. This melanoma was partially pigmented due to a small, pigmented superficial spreading component on the edge of the non-pigmented balloon cell nodule, prompting further evaluation. In retrospect there was the clue to malignancy of polarizing-specific white lines (chrysalis structures) and polymorphous vessels, including a pattern of dot vessels. The reticular lines exclude basal cell carcinoma, polarizing-specific white lines are inconsistent with the diagnosis of dermal nevus and their eccentric location is inconsistent with both Spitz nevus and dermatofibroma. Excision biopsy was performed, revealing a superficial spreading melanoma with two distinct invasive components, one of atypical non-mature epithelioid cells and the other an amelanotic nodular component, comprising more than 50% of the lesion, characterized by markedly distended epithelioid melanocytes showing pseudo-xanthomatous cytoplasmic balloon cell morphology. A diagnosis of balloon cell melanoma, Breslow thickness 1.9 mm, mitotic rate 3 per square millimeter was rendered. Wide local excision was performed, as was sentinel lymph node biopsy, which was negative.

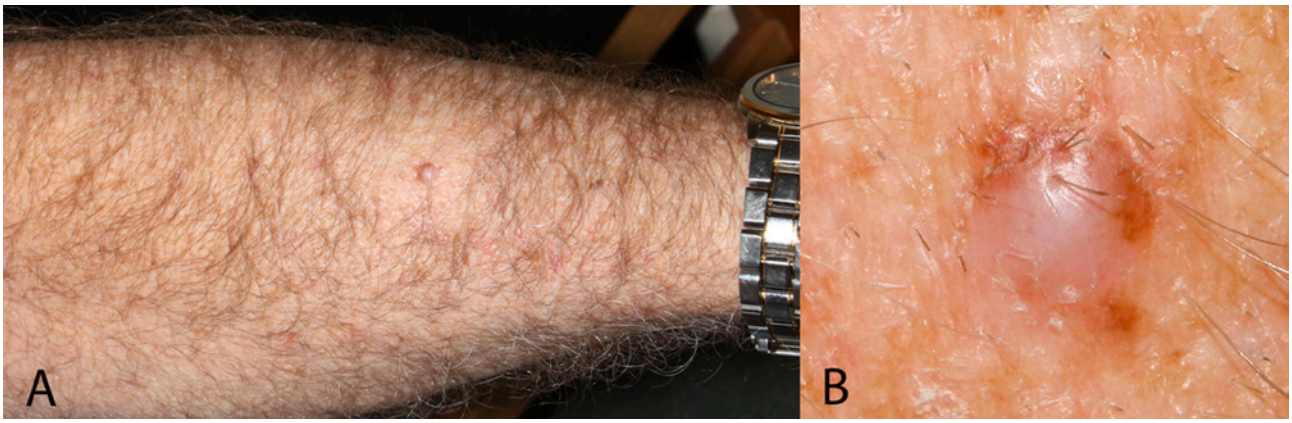

Figure 1. Clinical (A) and close up (B) images of a pale nodule on the forearm of a 61-year-old man with skin of Fitzpatrick photo-type 2. There are foci of eccentric pigmentation at the periphery. Three hairs, similar to surrounding hairs, are seen to be emerging from the nodule. [Copyright: ©2014 Maher et al.]

Case report

A 61-year-old man attended a primary care skin cancer practitioner in Ballarat, Victoria, Australia. There was no known family history of skin cancer. There was a past history of sunburn, and he had previously been treated for multiple non-melanoma skin cancers and one lentigo maligna. The only known comorbidity was hyperlipidemia for which the patient was taking a statin-class medication. The patient had no concern about any skin lesion and was not aware of a lesion on his left forearm in proximity to his wristwatch.

On examination the patient was noted to have skin of Fitzpatrick photo-type 2 and in addition to eight suspected BCCs, a lesion was noticed on the left forearm (Figure 1), which was firm and nodular to palpation. Clinical and close-up images (Figure 1A and B) taken with a Canon EOS 450D camera (Canon USA, Inc.) revealed a small, well-defined, isolated lesion on the radial aspect of the left forearm. It was clearly nodular, with a smooth shiny surface, pale over most of its surface area with three discrete areas of brown pigmentation asymmetrically distributed at the periphery. Three hair shafts were seen protruding from the surface of the nodule.

A polarized dermatoscopy image (Figure 2) taken with a DermLite DL3 dermatoscope (3Gen, LLC) coupled to a Canon EOS 450D camera showed a lesion 7 mm in maximum diameter. There was a central structureless white area with a rim of structureless brown at the superior border with very focal pigmented reticular lines. A small number of linear curved vessels were visible at the perimeter of the structureless white area and there was a pattern of dot vessels at the superior extremity of the image of the lesion (black arrow) and another at the lower left extremity (red arrow). The dot vessels seen at the top of the image were separated by a pattern of white perpendicular lines (black arrow) which were whiter than surrounding skin, that skin being characterized by confluent ephelides. A non-polarized dermatoscopic image (Figure 3) (DermLite DL3 /Canon EOS

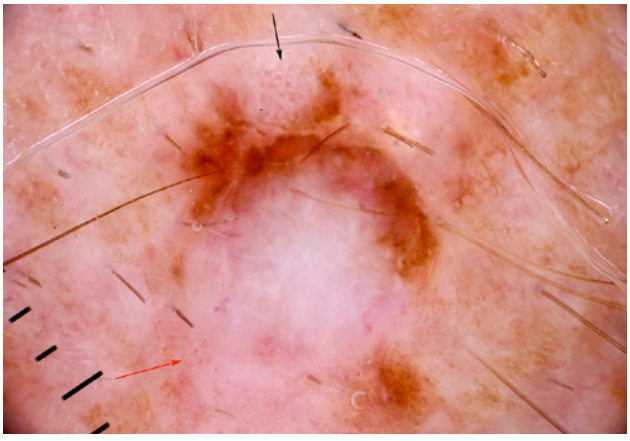

Figure 2. Polarized dermatoscopy image of the lesion shown in Figure 1. There is a structureless white area with a rim of structureless brown containing focal reticular lines. A focal pattern of dot vessels coincides with a focal pattern of polarizing-specific perpendicular white lines (black arrow). There is another separate focal pattern of dot vessels (red arrow). Elsewhere at the periphery of the structureless white area there are a several linear (curved) vessels. [Copyright: ©2014 Maher et al.]

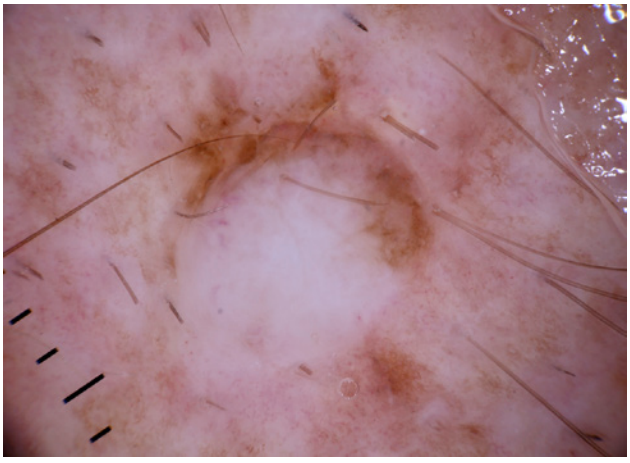

Figure 3. Non-polarized dermatoscopy image of the lesion shown in Figure 2. No white lines are seen in this image. [Copyright: ©2014 Maher et al.]

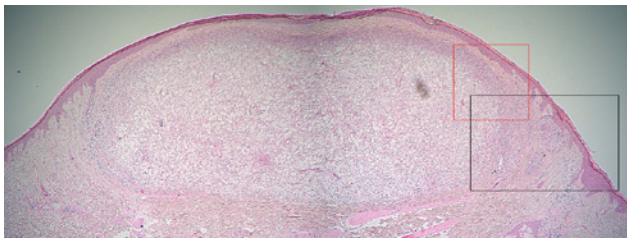

Figure 4. Low power dermatopathologic overview of the lesion shown in Figures 1-3 with a dominant nodular component comprised exclusively of markedly distended epithelioid melanocytes showing pseudo-xanthomatous cytoplasmic balloon cell morphology. On the right side of the image (black-boxed area) there is a separate invasive component of non-balloon cell malignant melanocytes. The black- boxed area is shown at higher power in Figure 5 and the red-boxed area in Figure 6. [Copyright: ©2014 Maher et al.]

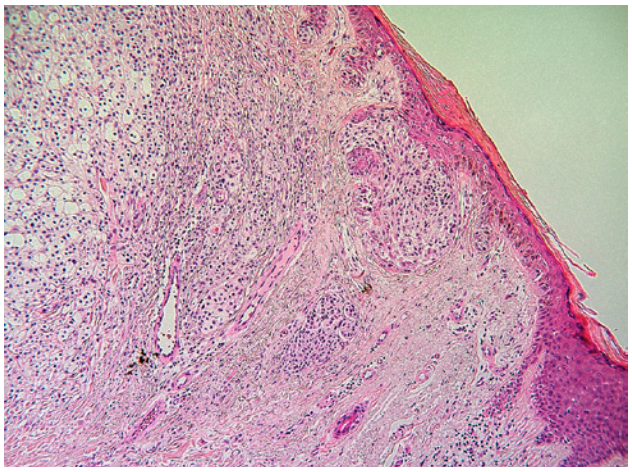

Figure 5. Medium high power view of the black-boxed area in Figure 4. Atypical melanocytes are confluent at the dermoepidermal junction, and on the right side of the image they are seen as a nested proliferation in the deep papillary dermis including nests in proximity to an eccrine duct. On the left side of the image a separate population of atypical melanocytes with distended balloon cell morphology is apparent. Melanin pigment can be seen at the dermoepidermal junction. [Copyright: ©2014 Maher et al.]

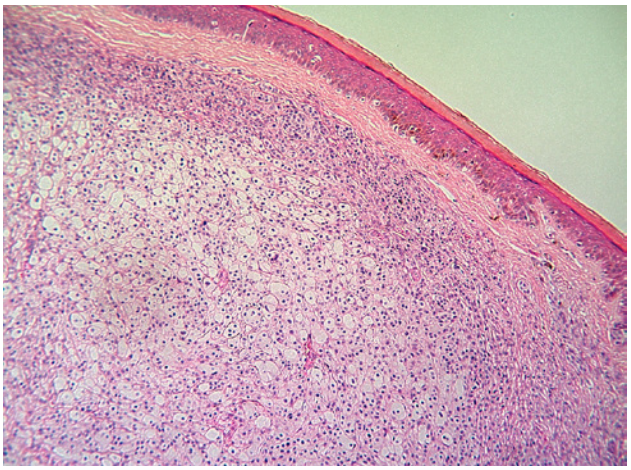

Figure 6. Medium high power view of the red-boxed area in Figure 4. The melanocytic proliferation at the dermoepidermal junction is only focally confluent and pagetoid spread is sparse and partial-thickness only. There is abundant melanin at the basal layer. Large balloon cells are closely packed in the reticular dermis with an absence of intervening stroma in this part of the lesion. [Copyright: ©2014 Maher et al.]

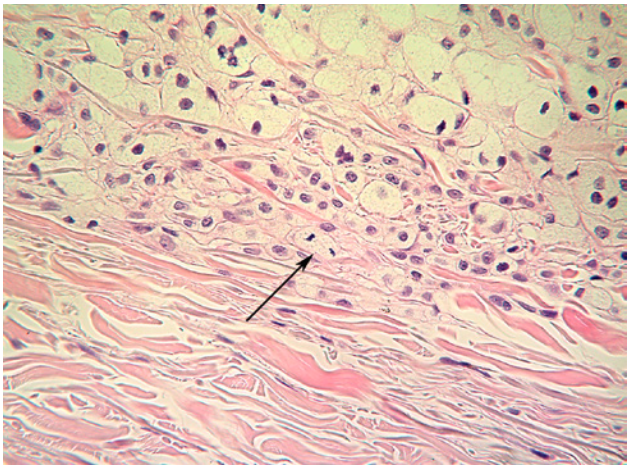

Figure 7. High power view of distended, vacuolated balloon cells in the base of the nodule shown in Figure 4. Arrows point to a cell in mitosis. [Copyright: ©2014 Maher et al.]

450D) showed the same features as the polarized image with the exception that the focus of perpendicular white lines was no longer visible and these white lines could therefore be described as polarizing-specific white lines, also known as chrysalis structures.

The patient was referred to a plastic surgeon who performed an excision biopsy. Histopathology (Figures 4-7) showed an atypical melanocytic lesion with an architecturally disorganized intraepidermal component composed of both nested and single atypical melanocytes with some areas of intraepidermal pagetoid spread (Figures 5 and 6). In one area, non-maturing atypical melanocytes arranged in variably sized nests and cords extended to the base of the papillary dermis (Figure 5, center). Adjacent to this (Figure 5, left side and Figure 6) there was a relatively large nodule of melanocytes, displaying nuclear atypia, including mitotic figures and balloon cell morphology, penetrating to the deep dermis (Figures 4 and 7). Staining with Ki67 was positive in the balloon cell component.

The lesion was signed out as a superficial spreading melanoma with an epidermal component, a dermal component of epithelioid cells and also a nodular component of balloon cells. Breslow thickness was 1.9 mm with a mitotic rate 3 per square millimeter. No associated nevus was identified. The balloon cell component comprised over 50% of the lesion histologically, which categorized this lesion as a balloon cell melanoma as defined by Kao et al [1].

Wide deep excision was performed, as was sentinel lymph node biopsy, which was negative. At follow up 2 years post-treatment there is no reported recurrent disease.

Conclusions

Balloon cell melanoma (BCM) was first described in 1970 [2] and it has actually been described as the rarest melanoma subtype [3]. The prognosis appears to be related to Breslow thickness as with melanoma subtypes in general [1,4], but presumably because BCM tends to be thick at the time of presentation, the mortality rate is reported to be high. In the largest study, 19 of 33 (57.5%) patients with follow-up data died of disseminated disease 2 months to 12 years after initial treatment [1].

The lesion reported here presented as a pale nodule with asymmetric peripheral pigmentation in contrast to the more common presentation of BCM as non-pigmented [3]. There were similarities to the clinical appearance of dermatofibroma (DF) which commonly presents as a nodule with a white center and reticular pigmentation peripherally [5]. The clinical appearance could also be interpreted as that of a dermal nevus, Spitz nevus or basal cell carcinoma (BCC), although Spitz nevus is rare at mature age. The various clinical appearances of BCM have been described in a review of the literature as nodular, as was the case with this one, as well as ulcerated, polypoid and papillomatous and the frequent absence of pigment has been noted [3].

Dermatoscopic examination confirmed the presence of chaos (defined as dermatoscopic asymmetry of structure and/or color) with the clue of an eccentric structureless (white) area, and this was seen as a clear indication for excisional biopsy according the algorithmic method for pigmented skin lesions, "Chaos and Clues" [6]. The asymmetric pigmentation was actually produced by the presence of a pigmented, non-balloon cell superficial spreading component beside the balloon-cell nodule, and it was this feature which made the clinician suspect melanoma both clinically and dermatoscopically. Additional clues to malignancy are also evident in the dermatoscopic images. There are polymorphous vessels including linear curved vessels and vessels as a pattern of dots (Figures 2 and 3), this pattern having been described as a clue to melanoma [7]. There is also a small focus of polarizing-specific white lines (also known as chrysalis structures) (Figure 2, black arrow). This structure has been described as a clue to melanoma, as well as to BCC, DF and Spitz nevus [8] and it is suggested in the reference cited that these chrysalis structures correlate with dermal fibrosis, which is present in this case (Figure 4). Notably the dermatoscopic features were not consistent with the alternative diagnoses to melanoma based on clinical assessment because focal pigmented reticular lines excluded BCC, polarizing-specific white lines excluded dermal nevus and their eccentric location was not consistent with either Spitz nevus or DF.

There is only one other reported case of BCM with dermatoscopy. It also presented as a nodule, but unlike the case reported here it was of concern to the patient who had traumatized it by scratching prior to presentation [9]. Clinically and dermatoscopically the previously reported case was completely amelanotic. In the absence of pigment, the clinician had suspected melanocytic status due to the presence of terminal hairs and had proceeded to perform a biopsy, at least in part, because of that. The presence of terminal hairs was considered consistent with the presence of a pre-existing congenital type nevus, which was confirmed dermatopathologically [9]. In the case we report here, hairs can also be seen emanating from the lesion but they are seen to be vellus hairs, identical to those on surrounding skin. The case reported here had no associated nevus, and therefore we assume that the hairs protruding from it are incidental vellus hairs engulfed by the growing tumor.

It has been reported that white globules correlate with balloon cell nests in balloon cell nevi [10]. In the only previously reported case of BCM with dermatoscopic images there were no white structures seen, only structureless yellow, presumed to be due to serous exudate consequent on ulceration [9]. In the case reported here the balloon cell component correlated with a white structureless area.

BCM is reported to be challenging dermatopathologically, and it is accepted that immunohistochemical stains as well as clinico-pathologic correlation may be required to distinguish BCM from differential diagnoses including balloon cell change in benign nevi, clear cell sarcoma, clear cell metastatic renal cell carcinoma, BCC, squamous cell carcinoma, malignant clear cell acrospiroma, sebaceous carcinoma and clear cell dermatofibroma [11]. The melanocytic nature of balloon cells has been confirmed by immunohistochemical studies [12] and electron microscopy [13,14,15]. BCM differs from balloon cell nevus with respect to nuclear pleomorphism, atypia, mitoses, an absence of intervening stroma and a lack of maturation of melanocytes with descent into the dermis [1]. The case reported here exhibited all of these features and an increased Ki-67 index in the balloon cell component. Another difference between balloon cell nevus and BCM is that melanocytes in BCM generally lack melanin [1,16]. The melanoma presented here was not amelanotic (Figures 5 and 6) but melanin was not detected in the balloon cell component (Figures 4 and 7).

BCM is regarded as a vertical growth phase melanoma [15] and as there are no reported cases of BCM with a junctional component of balloon cells it has been speculated that BCM may have a dermal origin [9]. BCM has previously been reported arising in the dermal component of superficial spreading melanoma [17], and it is possible that the melanoma reported here arose in that way.

BCM is a rare subtype of melanoma, characterized by presentation as a thick tumor relative to lateral dimensions with a correspondingly adverse prognosis. The case reported here,

unlike the previous reported case with a dermatoscopic image, exhibited clinical clues to malignancy related to asymmetrical distribution of melanin, which was present in the non-balloon cell component. It also had the dermatoscopic clue of polarizing-specific white lines. As a superficial spreading melanoma with a nodule of BCM, this lesion was able to be recognized with suspicion for melanoma and treated promptly.

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