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LETTER TO THE EDITOR

Radiation tattoos mimicking melanoma: a clinical observation

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Radiation therapy (RT) is a common form of treatment for solid malignancies. It involves pretreatment marking with dark-ink permanent tattoos to ensure reproducibility of set-up and precise radiation delivery. These blue-black ink tattoos can easily mimic metastases of malignant melanoma and other melanocytic neoplasms. This can be especially problematic in cases of unreliable medical history. We report two cases of patients with a history of malignancy in which radiation tattoos were clinically concerning for melanocytic neoplasm resulting in unnecessary biopsies, and a third case where cutaneous metastases of melanoma resembled radiation tattoos. Recognizing the similarities in appearance of radiation tattoos and melanocytic lesions is crucial as confusion could delay biopsy or result in unnecessary biopsies. Finally, we describe alternatives to the standard permanent ink tattoos, which may prevent confusion and have the added benefit of improving patient self-image.

Report of cases

Case 1: A 37-year-old female with a past medical history of cognitive impairment, paranoid schizophrenia and stage IIIc MM on the abdomen, presented with a concern by her surgeon for new lesions on the abdomen. Her primary MM had been treated with wide local excision, left axillary lymph node dissection, adjuvant RT to the left axilla and adjuvant nivolumab. The patient was unsure of how long the skin lesions had been present or if tattoos had been placed there prior to her RT. On exam, two blue-gray macules were present on the abdomen (Figure 1(a)). Although tattoo was considered in the differential diagnosis, the history of melanoma and unclear treatment history prompted a biopsy to rule out metastatic melanoma. The biopsy demonstrated extracellular pigment in the dermis, consistent with a tattoo (Figure 1(b)).

Case 2: A 65-year-old female with a past medical history of a surgically removed abdominal wall desmoid tumor presented with two round blue macules on the abdomen, thought to be blue nevi and stable on short term monitoring (Figure 1(c)). The patient denied any history of RT or tattoo placement. Because the lesions were reported to be new and were causing patient concern, biopsy was taken of one, which showed tattoo. Review of her medical records subsequently demonstrated that the patient had tattoo placement with intent to treat the desmoid tumor with RT; however, treatment was not initiated due to patient preference, and she had forgotten about the tattoo placement.

Case 3: A 37-year-old female, with a history of stage III MM of the right great toe, treated with amputation, right inguinal lymph node dissection, adjuvant RT to the right groin and adjuvant nivolumab, presented with two new lesions in the right inguinal crease (Figure 1(d)). The lesions were noted after her third cycle of nivolumab. Both lesions were small round blue-gray papules (Figure 1(d)). A punch biopsy confirmed metastatic melanoma.

Discussion

Here, we demonstrate that radiation tattoos can be virtually indistinguishable from melanoma and other sources of dermal pigmentation both on clinical and dermoscopic examination. Radiation tattoos are often 2–3 mm in diameter and are made with blue or black ink. On dermoscopy, radiation tattoos show homogenous blue-black pigmentation [1] (Figure 2). It is not surprising that tattoos and melanoma metastases can be indistinguishable given their histologic similarities of dermal pigmentation [2].

Permanent ink radiation tattoos have other drawbacks. For example, radiation treatment teams may mistake melanocytic lesions for radiation tattoos, potentially causing errors in radiation delivery. Metastatic lesions could be mistaken for tattoos leading to a delay in biopsy and diagnosis. Patient education as to the exact location of radiation tattoos is important, as electronic medical records with proper documentation may not always be available. When using electronic records to monitor the location of radiation tattoos, clinical photographs of tattoo placement should be included with copies provided to the patient.

In cases of inability to confirm exact tattoo placement due to lack of medical records or unreliable patient history, unnecessary biopsies may be performed, leading to undue cost and patient concern. There are several available alternatives to permanent tattoos, which can prevent confusion

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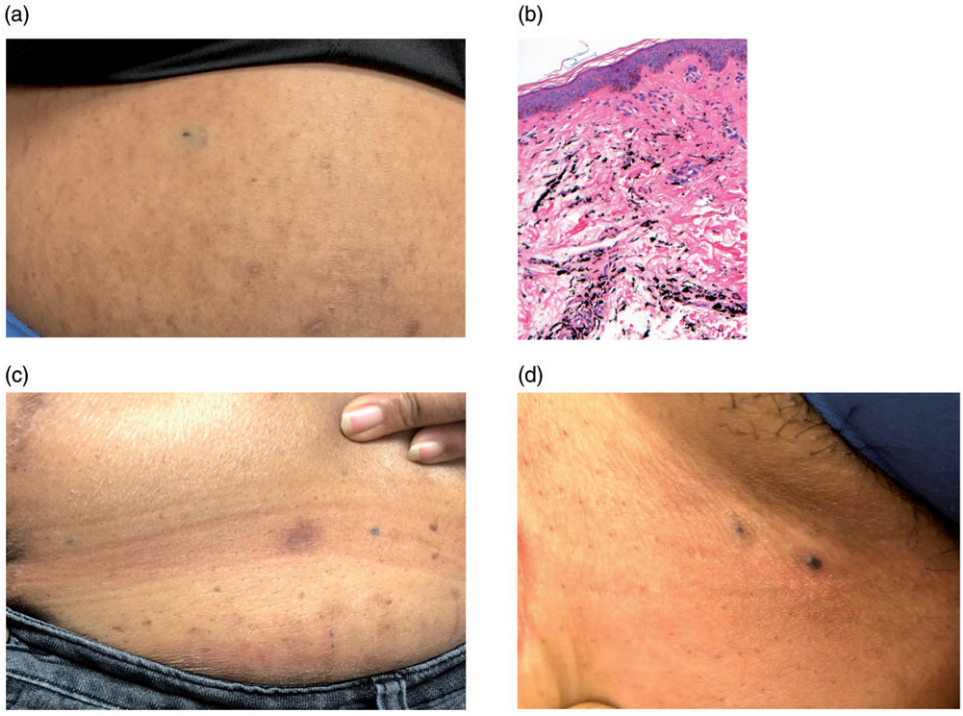

Figure 1. (a) Blue macule on the abdomen, confirmed to be tattoo. (b) Histopathology demonstrating evidence of extracellular pigment deposition from tattoo. (c) Two round blue macules on the abdomen, confirmed to be tattoos. (d) Two blue-gray papules in the right inguinal fold, confirmed to be metastatic melanoma.

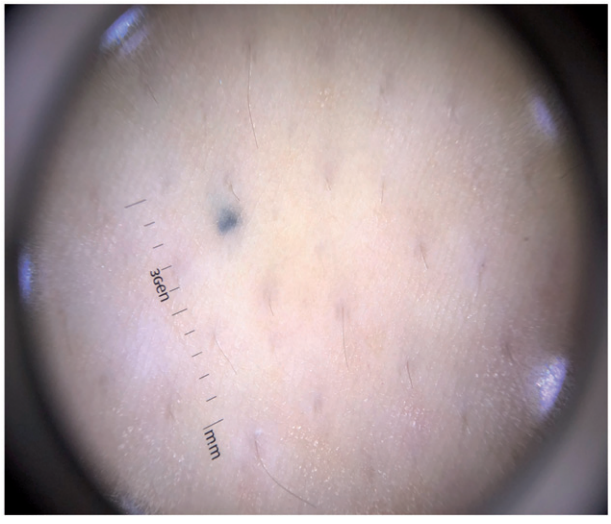

Figure 2. Radiation tattoo on dermoscopy: homogenous blue-black pigmentation can be appreciated.

following cancer therapy. Temporary henna tattoos and fluorescent ink tattoos have recently been studied for RT marking. Ultraviolet (UV) fluorescent ink tattoos display observable light when excited by the appropriate electromagnetic wavelength of light, but become invisible when the light source is removed. Studies have found UV ink tattoos are safe and effective in providing precise radiation dosing [3]. Henna tattoos have also been shown to be a safe and reliable method of skin marking prior to external RT [4]. One study showed henna tattoos last on average 23 d and require only 1–2 total marking procedures. No adverse cutaneous reactions have been reported although it should be noted that paraphenylenediamine is a common additive to black henna and can be a source of allergic contact dermatitis [4,5].

Less visible or temporary markings also may provide the added benefit over standard tattoos of improving patient self-image [3]. In fact, 15–30% of cancer survivors report body image concerns [3]. One study compared permanent ink to UV ink tattoos in breast cancer patients and found that 56% of patients who received UV ink tattoos felt positive about their bodies 1 month after RT compared to only 14% of patients who had received the standard permanent ink tattoo, suggesting that permanent ink tattoos may hinder patient self-image after RT completion [6].

Conclusion

In conclusion, this case series highlights the clinical and dermoscopic similarities between RT permanent ink tattoos and melanocytic lesions including metastatic malignant melanoma. Steps that should be taken to prevent unnecessary biopsies include patient education and accurate accessible documentation of tattoo placement. Finally, alternative methods of RT marking, including UV ink tattoos and henna tattoos, which may have the added benefit of improved body image for cancer survivors, should be considered.

Disclosure statement

The authors report no conflicts of interest.

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