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Authors

Saunders, Blair D
Nguyen, Mimi
Joo, Jayne S
et al.

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Desmoplastic intradermal spitz nevi arising within red tattoo ink

Blair D Saunders¹ BS, Mimi Nguyen² BS, Jayne S Joo² MD, Thomas H Konia² MD, Danielle M Tartar² MD PhD

Affiliations: ¹Department of Dermatology, Virginia Commonwealth University, Richmond, Virginia, USA, ²Department of Dermatology, University of California Davis, School of Medicine, Sacramento, California, USA

Corresponding Author: Danielle M. Tartar, Department of Dermatology, University of California Davis, School of Medicine, 3301 C Street, Suite 1400, Sacramento, CA 95816, Tel: 916-734-6795, Email: dtartar@ucdavis.edu

Abstract

Tattoos present a diagnostic challenge for dermatologists. Various reactions to tattoo have been identified in the literature ranging from allergic, to infectious, to neoplastic. Of the neoplastic cases identified, it is unclear whether the tattoo ink was directly causative, or if the cases were merely coincidence, as the number of cutaneous malignancies has also been on the rise. We present a novel case of two desmoplastic intradermal Spitz nevi arising within red tattoo ink.

Keywords: tattoo reaction, Spitz nevus, desmoplastic Spitz, red ink

Introduction

Tattoos have become increasingly popular in the past several decades in both the U.S. and abroad; in fact, nearly 25% of the U.S. population has at least one tattoo [1, 2]. This increase in the number of tattooed individuals at younger ages in the U.S. population is of particular importance to dermatologists, underscoring the need for proper diagnosis and treatment of potential complications, both neoplastic and otherwise. In this report, we describe two desmoplastic intradermal Spitz nevi arising within red tattoo ink.

Case Synopsis

A 28-year-old woman with a known family history of melanoma presented to the dermatology clinic for evaluation of two small, raised lesions within the red

ink of her multi-colored left arm sleeve tattoo. She reported that the tattoo was completed in 2013 and the first of the two raised areas developed approximately 8-12 months later. She did not recall any lesions in the areas involved prior to obtaining the tattoo. At that time, she sought the evaluation of a dermatologist who believed the area was a scar and did not suggest any further follow-up. She remained asymptomatic and without obvious indication of inflammation, drainage, or swelling. However, three years later, she developed a second raised area nearby, also within red ink, prompting her to return to the dermatology clinic for re-evaluation.

Examination revealed a 2cm oval-shaped, firm plaque within an area of red ink on her left forearm (**Figure 1A, B**, white box and arrow) with an adjacent 0.5cm papule of similar texture in a neighboring area of red ink (**Figure 1B**, black box and arrow). No overlying epidermal changes were noted. Punch biopsy was performed of the larger plaque (**Figure 1A**, both biopsy sites outlined in marker within white box) for both histologic evaluation and culture to rule out infectious etiology. Histologic examination revealed a dermal storiform proliferation of spindled mononuclear cells in association with thickened collagen fibers (**Figure 2A, B**). Gram, periodic acid-Schiff (PAS), and acid-fast bacilli (AFB) stains were negative, and culture was likewise negative. The cells were positive for the melanocytic markers microphthalmia-associated transcription factor (MitF), S100 and SRY-related HMB-box 10 (Sox10).



Figure 1. Two separate dermal plaques arising within red tattoo ink (white and black boxes, respectively). A 2cm oval-shaped, firm plaque arising within an area of red ink on the left forearm (**A**, white box and white arrow; **B**, white box and white arrow). Two smaller circles on panel A represent two biopsy sites for both hematoxylin and eosin staining and culture. **B**) Black square and black arrow: secondary 0.5cm papule of similar texture in a neighboring area of red ink.

Additionally, immunostaining for p16 demonstrated preserved expression, consistent with a melanocytic nevus versus desmoplastic melanoma [3]. Subsequent biopsy of the smaller papule on the left arm showed remarkably similar findings (**Figure 2C, D**). A final diagnosis of desmoplastic intradermal Spitz nevus was reached and the patient was referred for excision of both sites with 0.5cm margins.

Discussion

Lesions arising within tattoos can present quite the diagnostic challenge to dermatologists as tattoo ink can mask color changes and make changes more difficult to detect. As such, biopsy of all suspected tattoo reactions is recommended to evaluate for systemic disease or infection [4]. To our knowledge, this is the first case of a Spitz nevus arising within a tattoo. Both lesions were an unusual desmoplastic variant of Spitz nevus. Given the timing and distribution of these atypical, non-contiguous lesions, it is suspicious that the tattoo played a role their development.

In the setting of tattoo, exogenous pigments, dyes, and metallic salts remain in the dermis for the lifetime of the patient and the potential local and carcinogenic effects have yet to be fully elucidated [5]. Many reactions to tattoo have been identified, including transient inflammatory reactions

secondary to trauma, superficial and deep local infections, systemic infections, granulomatous and lichenoid reactions, and both Koebner and isotopic responses (psoriasis, lichen planus, pseudolymphoma, and morphea), [6]. Although the pathogenesis of the various reactions differ, the majority of allergic reactions occur in red ink in which a component of the tattoo pigment acts as a hapten in a type IV hypersensitivity reaction. In papulonodular reactions occurring in black ink, clusters of pigment are seen as foreign bodies and induce an inflammatory response, potentially leading to granulomatous inflammation or sarcoid granulomas in predisposed individuals [7]. The pathogenesis of cutaneous neoplasms arising in tattoos is less clear. Although tattoo ink is comprised of various potential carcinogens, the associated cutaneous malignancies could be the result of lesions present prior to tattoo placement or from other exposures such as ultraviolet radiation.

The concept of the “immunocompromised cutaneous district” may also partially explain the propensity of nevi and other cutaneous malignancies to arise within tattooed areas. This concept describes the phenomenon of cutaneous reactions and malignancies arising at altered sites in the skin; the isomorphic response or Koebner phenomenon being one such example of reactions occurring in compromised skin [8].

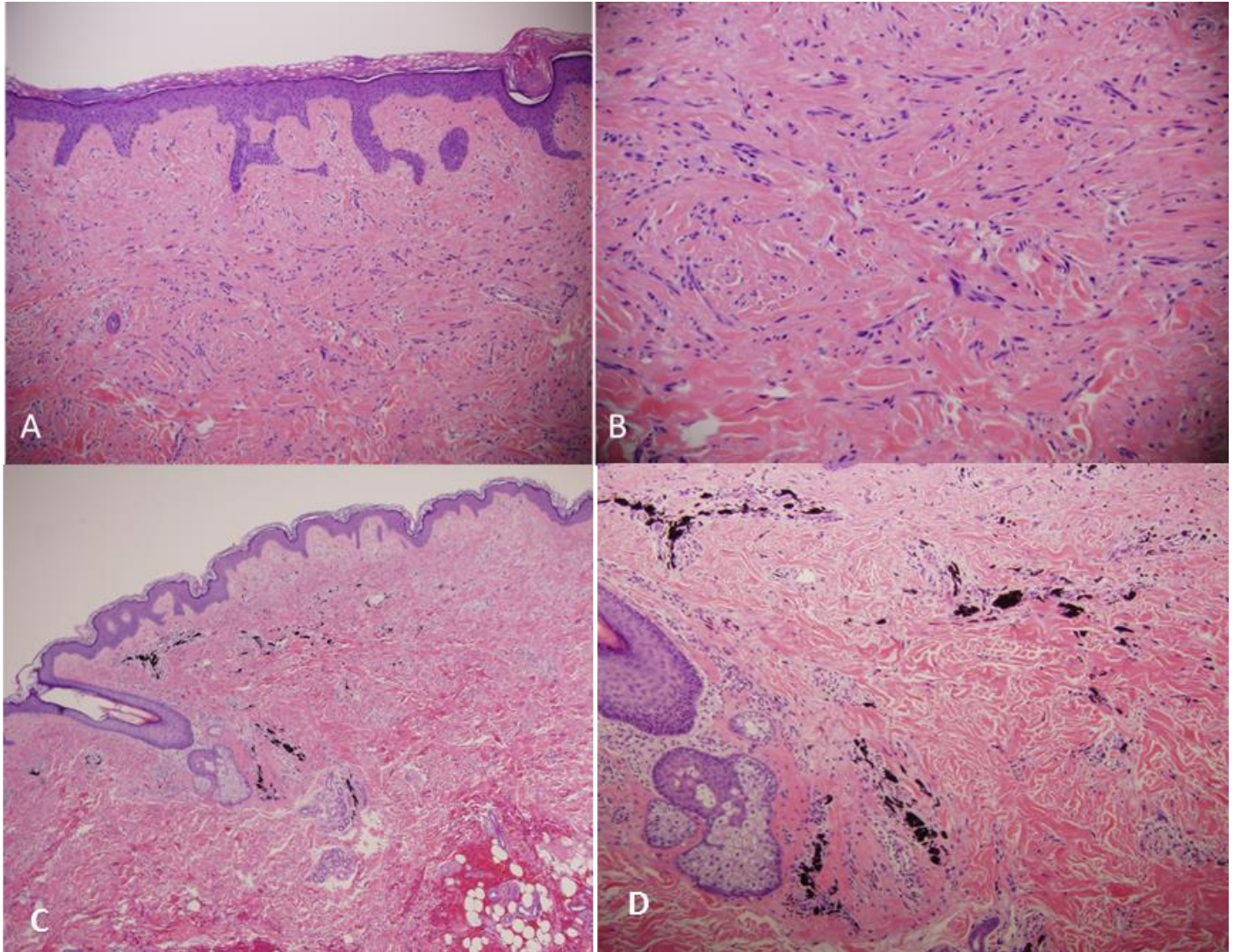


Figure 2. A, B) Dermal storiform proliferation of spindled mononuclear cells in association with thickened collagen fibers from the larger plaque (**A**, 40 \times ; **B**, 100 \times). **C, D)** and smaller papule (**C**, 40 \times ; **D**, 100 \times) on the left arm. H&E stain. Dark brown-black dermal staining represents tattoo pigment.

A recent literature review identified 64 cases of cutaneous neoplasms arising in tattoos diagnosed between 1938 and 2017, including squamous cell carcinoma, basal cell carcinoma, melanoma, and less-common cutaneous malignancies; the review described the characteristics of each case (**Table 1**), [9]. Of the neoplasms arising within tattoos, squamous cell skin cancer and keratoacanthomas are most common, possibly secondary to the trauma involved in the act of tattooing [5, 10, 11]. Seventeen cases of melanoma arising within tattoo ink have been reported, with time of tattoo to diagnosis of melanoma ranging from 3 months to over 40 years [5, 12]. The majority of melanomas reported to arise within tattoo ink arise in black,

blue, or green ink [5]. There was a single case of melanoma arising in red tattoo ink diagnosed 3 years after tattoo placement in which the patient was found to have in-transit metastases, all within the red tattoo ink [12]. To date, there has been no reported case of Spitz nevi arising within tattoo ink.

Spitz nevi are melanocytic proliferations of spindled and/or epithelioid melanocytes. They were first described in 1948 by Sophie Spitz as “juvenile melanomas” based on their histologic findings similar to that of melanomas, though they were noted to have less aggressive behavior [13]. Whereas they are largely considered benign lesions, rare instances of metastasis and death have been

Table 1. Cutaneous neoplasms arising within tattoo ink *adapted from Paprottka et al. [9].

Type of skin cancer	Number of Cases	Date of Publication	Gender	Median Age	Ink Color	Location	Skin Color
Malignant Melanoma [12, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35]	22	1938-2018	m = 17; f = 3; unknown = 2	45y	Black/Dark blue = 15; Red = 2; Green = 2	Arm = 10; Chest = 4; Leg = 2; Back = 5; Abdomen = 1; Face = 1	White = 10
Squamous Cell Carcinoma [9, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47]	13	1966-2017	m = 7; f = 5; unknown = 1	48y	Black/Dark blue = 4; Red = 7; Multicolor = 1	Arm = 6; Chest = 1; Leg = 3; Back = 1; Face = 2	White = 8
Basal Cell Carcinoma [23, 48, 49, 50, 51, 52, 53, 54]	11	1976-2009	m = 6; f = 5	56y	Black/Dark blue = 10; Red = 1; Green = 1	Arm = 2; Back = 4; Face = 5	White = 4
Keratoacanthoma [41, 55, 56, 57, 58, 59, 60]	16	1973-2009	m = 9; f = 5; unknown = 2	50y	Black = 1; Red = 10; Yellow = 1	Arm = 6; Leg = 7; Back = 1	White = 9; Black = 1
Leiomyosarcoma [61]	1	2009	m = 1	41y	Black = 1	Arm = 1	–
Dermatofibroma [62]	2	2008	m = 2	35y	Black = 1	Arm = 1; Leg = 1	–
Dermatofibrosarcoma protuberans [63, 64]	2	2005, 2011	m = 2	44y	Black = 1; Red = 1	Arm = 1; Back = 1	–
Total	67	1938-2018	m = 66% (n = 44); f = 27% (n = 18); unknown = 7% (n = 5)	9-79y	Black/Dark blue = 33; Red = 21; Multicolor = 1; Green = 3; Yellow = 1	Arm = 27; Chest = 5; Leg = 13; Back = 8; Abdomen = 1; Face = 8	–

reported [14]. Spitz nevi exist on a histologic spectrum, ranging from common Spitz nevi that are frequently seen in children and are thought of as benign to “spitzoid melanoma,” which is more accurately considered melanoma with Spitz-like features, than a Spitz nevus [13]. Desmoplastic Spitz nevi share histologic features with dermatofibroma, desmoplastic blue nevi, and desmoplastic melanoma [14]. They differ from desmoplastic melanoma histologically with better circumscription and maturation, and more frequently involve adnexal structures [15]. Excision of Spitz nevi is

recommended in adults, with wide local excision recommended for atypical lesions [14].

In this case, two separate intradermal desmoplastic Spitz nevi arose within red ink of a tattoo and both lesions were subsequently excised.

Conclusion

We present a case of two intradermal desmoplastic Spitz nevi arising within the red ink that highlights need for thorough malignancy screenings at the site of tattoos.

References

1. Laumann AE, Derick AJ. Tattoos and body piercings in the United States: a national data set. *J Am Acad Dermatol*. 2006;55(3):413-21. [PMID: 16908345].
2. Pew Research Center. Tattoo taboo. : 2010. Available from: <http://www.pewresearch.org/fact-tank/2010/03/24/tattoo-taboo/>. Accessed on January 2, 2018.
3. Hilliard NJ, Krahl D, Sellheyer K. p16 expression differentiates between desmoplastic Spitz nevus and desmoplastic melanoma. *J Cutan Pathol*. 2009;36(7):753-9. [PMID: 19519606].
4. Simunovic C, Shinohara MM. Complications of decorative tattoos: recognition and management. *Amer J Clin Dermatol*. 2014;15(6):525-36. [PMID: 25385257].
5. Kluger N, Koljonen V. Tattoos, inks, and cancer. *Lancet Oncology*. 2012;13(4):e161-8. [PMID: 22469126].
6. Bassi A, Campolmi P, Cannarozzo G, et al. Tattoo-associated skin reaction: the importance of an early diagnosis and proper treatment. *BioMed Rese Intl*. 2014;2014:354608. [PMID: 25147796].
7. Serup J. How to Diagnose and Classify Tattoo Complications in the Clinic: A System of Distinctive Patterns. *Curr Prob Dermatol*. 2017;52:58-73. [PMID: 28288451].
8. Caccavale S, Kannangara AP, Ruocco E. The immunocompromised cutaneous district and the necessity of a new classification of its disparate causes. *Indian J Dermatol Venereol Leprol*. 2016;82(2):227-9. [PMID: 26924409].
9. Paprottka FJ, Krezdorn N, Narwan M, et al. Trendy Tattoos-Maybe a Serious Health Risk? *Aesthetic Plast Surg*. 2018;42(1):310-21. [PMID: 29124377].
10. Kluger N, Douvin D, Dupuis-Fourdan F, et al. [Keratoacanthomas on recent tattoos: Two cases]. *Annal Dermatol Venereol*. 2017;144(12):776-83. [PMID: 29126557].
11. Junqueira AL, Wanat KA, Farah RS. Squamous neoplasms arising within tattoos: clinical presentation, histopathology and management. *Clin Exp Dermatol*. 2017;42(6):601-6. [PMID: 28661073].
12. Joyce CW, Duff G, McKenna D, Regan PJ. Malignant Melanoma Arising in Red Tattoo Ink. *Arch Plast Surg*. 2015;42(4):475-7. [PMID: 26217569].
13. Luo S, Sepehr A, Tsao H. Spitz nevi and other Spitzoid lesions part I. Background and diagnoses. *J Am Acad Dermatol*. 2011;65(6):1073-84. [PMID: 22082838].
14. Luo S, Sepehr A, Tsao H. Spitz nevi and other Spitzoid lesions part II. Natural history and management. *J Am Acad Dermatol*. 2011;65(6):1087-92. [PMID: 22082839].
15. Nojavan H, Cribier B, Mehregan DR. [Desmoplastic Spitz nevus: a histopathological review and comparison with desmoplastic melanoma]. *Annal Dermatol Venereol*. 2009;136(10):689-95. [PMID: 19801251].