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Case and Review

Lichenoid Reaction Pattern with Pseudoepitheliomatous Hyperplasia – A Rare Tattoo Reaction: A Case Report and Review of the Literature

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Abstract
Pseudoepitheliomatous hyperplasia is a benign histologic reaction pattern that in rare cases can occur shortly after a tattooing procedure. We describe a case of pseudoepitheliomatous hyperplasia in two tattoos on the same patient 1 year after filling with the same batch of red ink.

Introduction

Cutaneous tattoo reactions can occur in response to exogenous pigment deposition. Histologic patterns that can occur after tattooing include granulomatous, eczematous, pseudolymphomatous, lichenoid, and malignant reactions. Pseudoepitheliomatous hyperplasia (PEH) is a benign reaction pattern characterized by hyperplasia of the epidermis. This type of pattern can be seen in response to several conditions, including infections, inflammatory diseases, and cutaneous malignancy [1]. PEH secondary to a tattoo is rare; however, it has been reported within areas of red or purple ink [1–10]. The etiology of this reaction is unknown, and treatment can be challenging. Furthermore, PEH is frequently misdiagnosed as squamous

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cell carcinoma even by experienced dermatopathologists [6]. In this report, it is described how PEH can be differentiated from a true malignancy and the potential explanation for the etiology of this rare condition is proposed.

Case Report

A 52-year-old previously healthy Caucasian female presented with a 6-month history of firm, verrucous plaques arising within the red pigment of two tattoos on the left dorsal hand and left anterior wrist. The plaques were confined to the areas of red ink and occurred 1 year after having the red pigment added to the tattoo (Fig. 1). The patient endorsed pain and pruritus from both of the involved lesions. A professional artist filled both tattoos with red pigment on the same date. She endorsed visiting Florida and having sun exposure prior to development of the plaques. She had several other red-pigmented tattoos obtained years prior at another tattoo parlor without any skin abnormalities. A shave biopsy was obtained for hematoxylin-eosin analysis to rule out cutaneous malignancy. Histopathology showed significant amounts of PEH admixed with a dense lichenoid infiltrate with numerous necrotic keratinocytes. On high power, there was red exogenous tattoo pigment easily identified (Fig. 2). The histopathologic differential diagnosis was between PEH and hypertrophic lichen planus associated with red tattoo pigment. Notably, these findings were limited to areas of red pigment within the same batch of ink. This patient was also presented at the Indiana University Department of Dermatology Grand Rounds with a universal consensus concerning the diagnosis of these lesions. The patient is planning to attempt treatment with carbon dioxide laser.

Discussion

Tattooing is a common practice performed for cosmetic appearance and cultural beliefs. Adverse reactions to tattooing can occur with different morphologies and histopathologic reaction patterns [11]. Delayed cutaneous reactions can also occur, usually due to red pigment, and include granulomatous, allergic, lichenoid, and pseudolymphomatous reactions [2]. Zemtsov and Wilson [12] were among the first to report that tattoo pigment can induce an autoimmune response. Cutaneous malignancies can also occur.

Most reactions depend in some part on the color of the tattoo pigment. Red-pigmented tattoos can be associated with photosensitive, granulomatous, as well as lichenoid reaction patterns; however, photosensitive reactions are most often in black-pigmented tattoos [3, 18]. Cutaneous malignancy can also occur within red pigment tattoos, with squamous cell carcinoma and keratoacanthomas being the most common. Reports of basal cell carcinoma, dermatofibrosarcoma protuberans, and melanoma have also been reported in red tattoos; however, in some of these cases the true link between the tattoo and the occurrence of the lesion is speculative [13].

PEH is a rare tattoo reaction that can occur within red or purple tattoo pigment. Goldstein [8] described the first case in 1967 and only a total of 13 cases have been described in the literature. It is typically associated with a painful, pruritic rash and has been reported to occur within 1 week to 1 year after tattooing [1–10]. This finding is viewed as a benign histologic reaction pattern rather than a specific disease state. Histopathologically, it is described as irregular hyperplasia of the epidermis that can involve the acrosyringium and the follicular infundibulum. The hallmark findings are prominent acanthotic down growth with irregular

epidermal hyperplasia and abundant cellular cytoplasm [14]. Newer reports have also observed a consistent lichenoid reaction pattern in many of the previously published cases. The pattern is similar to hypertrophic lichen planus, and a recent article suggested that this entity should be more specifically referred to as a "lichenoid reaction pattern with pseudoepitheliomatous hyperplasia" or "hypertrophic lichen planus-like reaction" [3]. A similar lichenoid reaction pattern was also seen in our case suggesting an autoimmune etiology. This entity should be distinguished from possible cutaneous malignancy as well as infectious causes [1]. For these reasons, histopathologic examination is often performed. PEH is favored over malignancy when associated with exogenous pigment within the dermis along with a lack of keratinocytic atypia and absence of mitotic activity [2]. Malignant cutaneous neoplasms also often occur many years after tattooing [15]. Staining with markers for p53 can be helpful in distinguishing between keratoacanthoma and PEH [4].

The etiology remains unknown; however, several factors have been proposed including sun exposure [4] and possibly the role of the ink used [5]. A few reports have shown that it can occur in areas tattooed with the same out-of-date red ink; however, it is difficult to determine an exact link since there is no data to evaluate consequences of using out-of-date ink [5]. Our patient had both sun exposure from a recent trip to Florida as well as occurrence of the lesions only within the same batch of red ink. Unfortunately, the patient did not know any further details on the type, quality, or expiration date of the ink used. It was significant that she had several other red-pigmented tattoos placed at a different parlor with different ink, without any skin changes. Other proposed etiologies include an isomorphic response of another classic skin disease such as psoriasis or lichen planus, which have both been described in tattooing [16, 17]. This explanation is also favored by the authors of the present paper; we propose that PEH is an autoimmune condition and the observed epidermal hyperplasia, similar to psoriasis, is the result of lymphocytic derived chemokines inducing keratinocyte proliferation.

Treatment can be challenging since there have been few reports of this reaction pattern. In the 13 cases described in the literature, topical and intralesional steroids [5–7], complete excision [1, 4, 6, 8, 9], intralesional 5-FU [3], and carbon dioxide laser [6] have been attempted with varied results. Several of these cases were also lost to follow-up [2, 5]. A few resolved without any treatment [3]. Shaving the affected tattoo is another possible treatment option [19]. With histologic similarities to hypertrophic lichen planus, it has been suggested to treat it like lichen planus with calcineurin inhibitors, PUVA, ultraviolet A1, or excimer laser [3].

Conclusion

PEH is a rare reaction with only 13 cases reported that can occur after tattooing with red or purple pigment. We describe an additional case of this reaction. Diagnosis can be challenging, and histologic evaluation is necessary to rule out cutaneous malignancy. The possible autoimmune explanation regarding the etiology of this condition has been proposed. Treatment has been attempted with several different modalities; however, the efficacy of these treatments is unclear. Dermatologists should be aware of this rare entity to prevent misdiagnosis and understand the possible associated lichenoid inflammatory reaction in regard to treatment.

Statement of Ethics

We state that our patient gave informed consent. The research complies with all ethical guidelines for human studies.

Disclosure Statement

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Fig. 1. **a–c** Firm, verrucous plaques within the red pigment of two tattoos on the left dorsal hand (**a**) and left anterior wrist (**b**). Both tattoos were colored with the same red-pigmented ink on the same date and at the same tattoo parlor. Another tattoo (**c**) with red pigment on the same patient without change, done prior at a different parlor with different ink.

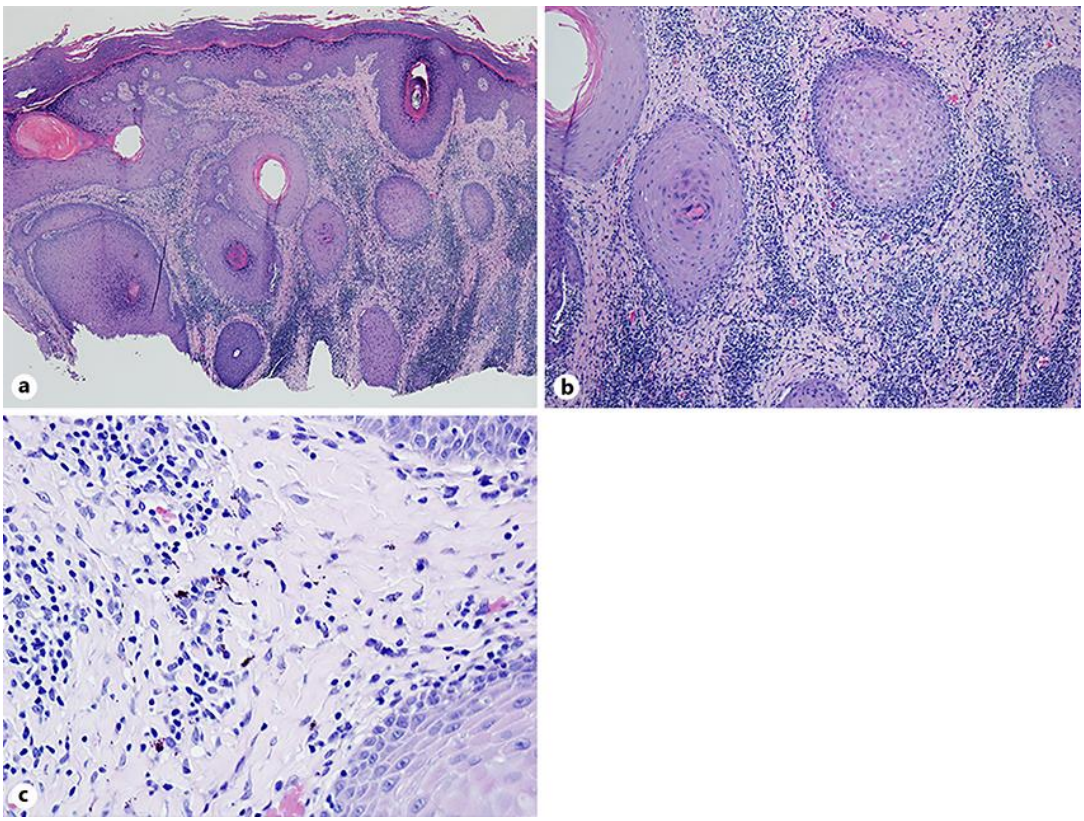

Fig. 2. **a–c** On low power, there is evidence of pseudoepitheliomatous hyperplasia and a dense lymphocytic infiltrate (**a**). On higher power, there is a close relationship between the lymphocytic infiltrate and areas of pseudoepitheliomatous hyperplasia with several necrotic keratinocytes (**b**). At 40× magnification, there is easily identifiable red tattoo pigment within the inflammatory infiltrate (**c**).