CASE REPORT

Successful Treatment of Tattoo-Induced Pseudolymphoma with Sequential Ablative Fractional Resurfacing Followed by Q-Switched Nd: YAG 532 nm Laser

Decorative tattooing has been linked with a range of complications, with pseudolymphoma being unusual and challenging to manage. We report a case of tattoo-induced pseudolymphoma, who failed treatment with potent topical and intralesional steroids. She responded well to sequential treatment with ablative fractional resurfacing (AFR) followed by Q-Switched (QS) Nd:YAG 532 nm laser. Interestingly, we managed to document the clearance of her tattoo pigments after laser treatments on histology and would like to highlight the use of special stains such as the Grocott's Methenamine Silver (GMS) stain as a useful method to assess the presence of tattoo pigment in cases where dense inflammatory infiltrates are present.

KEYWORDS: Ablative fractional resurfacing, pseudolymphoma, Q-switched Nd:YAG 532nm laser, tattoo-induced

INTRODUCTION

Tattooing is associated with a variety of complications, with pseudolymphoma confined to the tattoo area being rare and difficult to treat. We report a case of tattoo-induced pseudolymphoma treated sequentially with ablative fractional resurfacing (AFR) followed by Q-Switched (QS) Nd:YAG 532 nm laser. Interestingly, our case has histology to support the removal of the culprit tattoo pigment in the sites that had been treated with lasers, hence confirming that the sequential use of lasers effectively remove pigments.

CASE REPORT

A 45-year-old Chinese female developed pruritic nodules confined to the red areas of her tattoo over her left ankle [Figure 1] 4 months after placement by a professional tattoo artist. The tattoo was in the form of a red heart containing two black eyes. Physical examination revealed erythematous nodules over the red-coloured portion of the tattoo, some coalescing into plaques.

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Initial differentials included an allergic contact dermatitis to the red dye, granulomatous reactions secondary to a foreign body, sarcoidosis or infections. Histology revealed a top-heavy lymphocytic infiltrate with numerous eosinophils within. Dark red, non-polarisable exogenous pigment was scattered throughout the dermis [Figure 2]. Immunohistochemical stains showed an infiltrate of mainly T cells, with a cluster of differentiation (CD) 4:CD8 ratio of 4:1. There were a few aggregates of CD20 positive B cells admixed within the infiltrate. Fungal and mycobacteria cultures were negative.

Based on clinicopathologic findings, a diagnosis of tattoo-induced pseudolymphoma was made. The reaction did not respond to clobetasol proprionate United States Pharmacopoeia (USP) ointment 0.05% and intralesional triamcinolone acetonide 10 mg/ml. She received AFR laser treatment (SmartXide^2, DEKA) monthly for three sessions, with good improvements and reduction in swelling and pigmentation. Parameters used included power: 30 watts, dwell time: 1500 µs, smart stack 1, spacing: 500 µm.

Tan Siyun Lucinda, Oon Hwee Boon Hazel, Lee Siong See Joyce, Chua Sze Hon
Department of Dermatology, National Skin Centre, Singapore

Address for correspondence:
Dr. Tan Siyun Lucinda, 1 Mandalay Road, Singapore-308 205, Singapore. E-mail: lucindatan@nsc.gov.sg

She was then treated with three sessions of Q-switched (QS) Nd:YAG laser (Revlite®, ConBio ™, USA) monthly at the following parameters: Red tattoo-532 nm, 3 mm spot size, fluences between 2 J/cm^2 and 3 J/cm^2. The black tattoo was treated with the 1064 nm, 4 mm spot size, fluences between 8 J/cm^2 and 10 J/cm^2.

The patient preferred to excise the residual black pigments and an elliptical excision specimen of both the "eyes" was done, which also incorporated adjacent skin that had been treated for the red tattoo pigmentation. Histology revealed epidermal spongiosis and reactive lymphoid hyperplasia with eosinophils, scar tissue as well as residual exogenous black tattoo pigment. However, no residual red tattoo pigment was present in the sites that had been treated for the red tattoo pigmentation [Figure 3]. The Grocott's Methenamine Silver (GMS) stain was used as the lymphocytes and eosinophils adopt the colour of the special stain (green in GMS) and are thus not visualised, while the red tattoo pigment retains its red colour, thereby, allowing the red tattoo to be recognised as exogenous pigment.

Figure 4 showed the end result after 7 months cessation of laser treatments. There was residual hypopigmentation but the overall lesion remained flattened with no recurrence of swelling and inflammation up to 12 months post-treatment.

DISCUSSION

Tattoo-induced pseudolymphoma is a rare entity with approximately 20 cases reported so far.[1] It preferentially affects the red-coloured component due to mercury sulphide. Pseudolymphomas are commonly a combination of T-cell and B-cells. Immunohistochemical stains and T-cell receptor gene rearrangement can be performed to exclude a malignant lymphoma. Lymphocyte proliferation may be triggered by an immunogenic pigment, leading to sensitisation and development of a delayed hypersensitivity response.

Clinical differentials include allergic contact dermatitis to the red dye, lichenoid or granulomatous reactions from tattoos,[2] as well as cutaneous infections such as atypical mycobacterial and deep fungal infections. Patch testing would have been useful to evaluate for allergic contact dermatitis, but this was not performed in our patient. Histology played an important role in arriving at a definitive diagnosis, which was further confirmed with the disappearance of the tattoo pigments in histology slides post laser treatments.

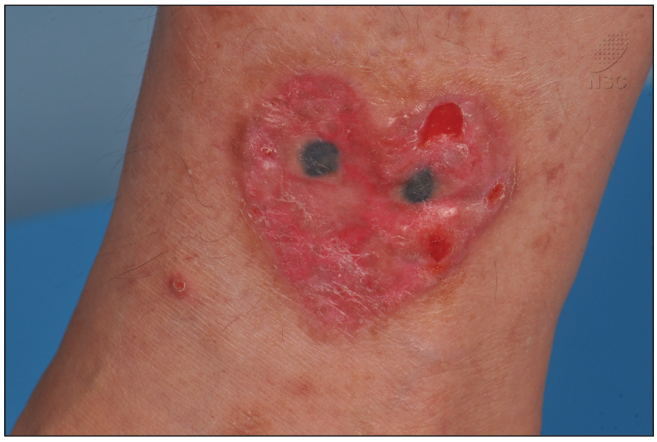

Figure 1: Swelling and infiltration confined to the red, heart-shaped tattoo on the left ankle, sparing the blue-black regions

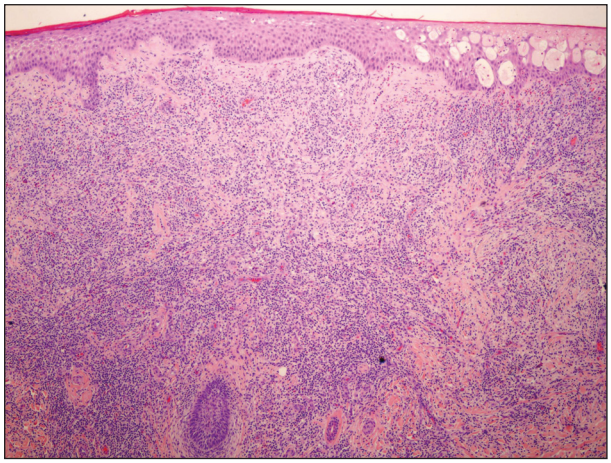

Figure 2: Top-heavy dense diffuse infiltrate of lymphocytes with esoinophils extending to the lower reticular dermis, associated with epidermal spongiosis. Red exogenous pigment is scattered within the dermis. (H&E ×40)

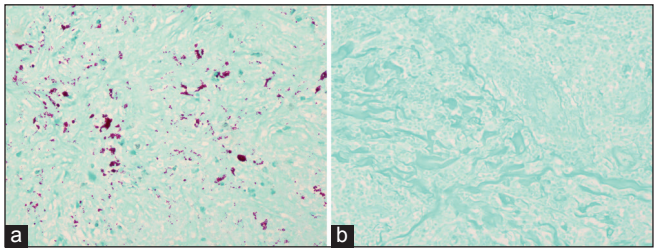

Figure 3: Biopsy of skin taken from the site with red tattoo (a) Red tattoo pigment present within the dermis at initial presentation prior to treatment. (b) Absence of residual red pigment after three sessions of ablative fractional resurfacing (AFR) laser three sessions of Q-Switched (QS) Nd:Yag laser therapy. (GrocottÊs Methenamine Silver (GMS) stain ×200)

Management of this condition is challenging. The progression of pseudolymphomas to overt cutaneous lymphomas can be induced by persistent antigenic stimulation from the tattoo pigments. Removal of the offending antigen with simple excision is curative

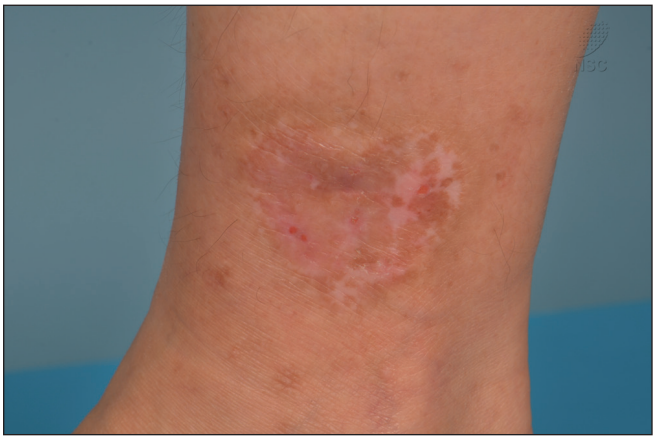

Figure 4: Flattened patch with areas of hypopigmentation over previous tattoo-induced pseudolymphoma site

but not always feasible. There have been reports of effective treatment with potent topical and/or intralesional corticosteroids alone, which was not seen in our patient.

Various lasers have been used, on the basis that cessation of antigenic stimulus via pigment removal, would lead to resolution of pseudolymphoma. A combination of AFR and QS 532 nm Nd:Yag lasers have been reported for tattoo removal, with mixed results due to incomplete clearance of pigment.[3] AFR uses laser microbeams to form an array of very small, deep zones of tissue removal with intervening areas of normal looking skin.[4] It is postulated that a portion of the tattoo is physically removed with each treatment. The creation of microscopic channels allows extrusion of tattoo pigments to occur. QS lasers are postulated to remove tattoo pigments via transepidermal elimination, lymphatic channels as well as rephagocytosis.[5] Paradoxical darkening of tattoos containing red pigments are due to the reduction of ferric oxide (Fe^{3+}) to ferrous oxide pigment (Fe^{2+}).[6] Our patient did report darkening of her tattoo after the first session of her QS laser, which improved with subsequent sessions. Generalised allergic reactions after lasers due to the release of antigenic ink particles into the haematologous or lymphatic systems are rarely reported.[7] There have been reports of using ablative fractional resurfacing for treatment of tattoo allergy, with no progression to systemic hypersensitivities.[5] Our patient was not pre-treated with antihistamines or systemic corticosteroids and remained well during laser treatments.

In the literature, QS lasers are used first, followed by AFR. It has been postulated that the robust inflammatory and phagocytic phase induced by AFR would aid in removal of the QS laser treated tattoo pigments. AFR prevents blister formation after QS laser, allowing release of fluid via the zones of ablation. This helps with removal of pigment, faster healing and less hypopigmention.[3] However, in our case, we performed 3 sessions of AFR prior to 3 sessions of QS lasers, with good results. After the inflammatory reaction ablated with the AFR treatments, the focus was then on removing the residual tattoo via standard QS lasering. Final outcome in our case was excellent and the inflammatory reaction did not recur up to 12 months post-treatment.

From a histological perspective, the presence of a dense infiltrate of lymphocytes and eosinophils made visualization of the red tattoo pigment difficult on routine haematoxylin and eosin stain. We found the use of special stains such as GMS stain a simple and useful method to assess the absence or presence of tattoo pigment and recommend the use of such special stains to visualise exogenous pigment in cases where a dense inflammatory infiltrate is encountered, as in our case.

In summary, we report a case of pseudolymphoma developing in the red colour of a tattoo, successfully treated by sequential use AFR followed by QS 532 nm Nd:YAG laser. For this rare and difficult-to-treat complication of tattooing, combination laser therapies may augment conventional corticosteroid treatment in removing the antigenic stimuli and quenching the excessive inflammatory response.

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