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DOI: [10.1159/000174102](https://doi.org/10.1159/000174102)**Cutaneous T Cell Pseudolymphoma at the Site of a Semipermanent Lip-Liner Tattoo**Jae Bin Shin^a, Soo Hong Seo^a, Byoung Kwon Kim^b, Il Hwan Kim^a, Sang Wook Son^aDepartments of ^aDermatology and ^bOccupational and Environmental Medicine, Korea University College of Medicine, Seoul, Korea*Key Words*

Pseudolymphoma · Semipermanent tattoo · Lip-liner tattoo

Introduction

Tattoos are becoming more popular not only as a form of body art, but also for cosmetic adornment. Complications, such as allergic reactions, infections and incidental tumorous lesions brought about by this fashionable insult are often neglected. Semipermanent tattoo cosmetic adornment is becoming increasingly popular in Western and East-Asian societies. We present a case of a pseudolymphoma localized to the site of a semipermanent lip-liner tattoo.

Case Report

A 46-year-old woman presented with a 1-year history of linear swelling on both lips, which had developed gradually after application of a semipermanent lip-liner tattoo. She denied any localized symptoms, such as pruritus or tenderness, and had no other specific illnesses.

The physical examination revealed red-colored and indurated swelling along the lines outlined with tattoo ink on both the upper and lower lip margins (fig. 1a). Laboratory findings, including a complete blood count, serum chemistry and peripheral blood smear, were all within normal limits.

Histopathologic examination of a skin biopsy specimen showed diffuse and dense cellular infiltration through the entire dermis (fig. 2a). The inflammatory infiltrate was mainly composed of lymphocytes, but also included macrophages in the upper dermis that occasionally contained pigment granules (fig. 3). There was no evidence of germinal center or lymphoid follicle formation. Immunohistochemistry showed that the majority of

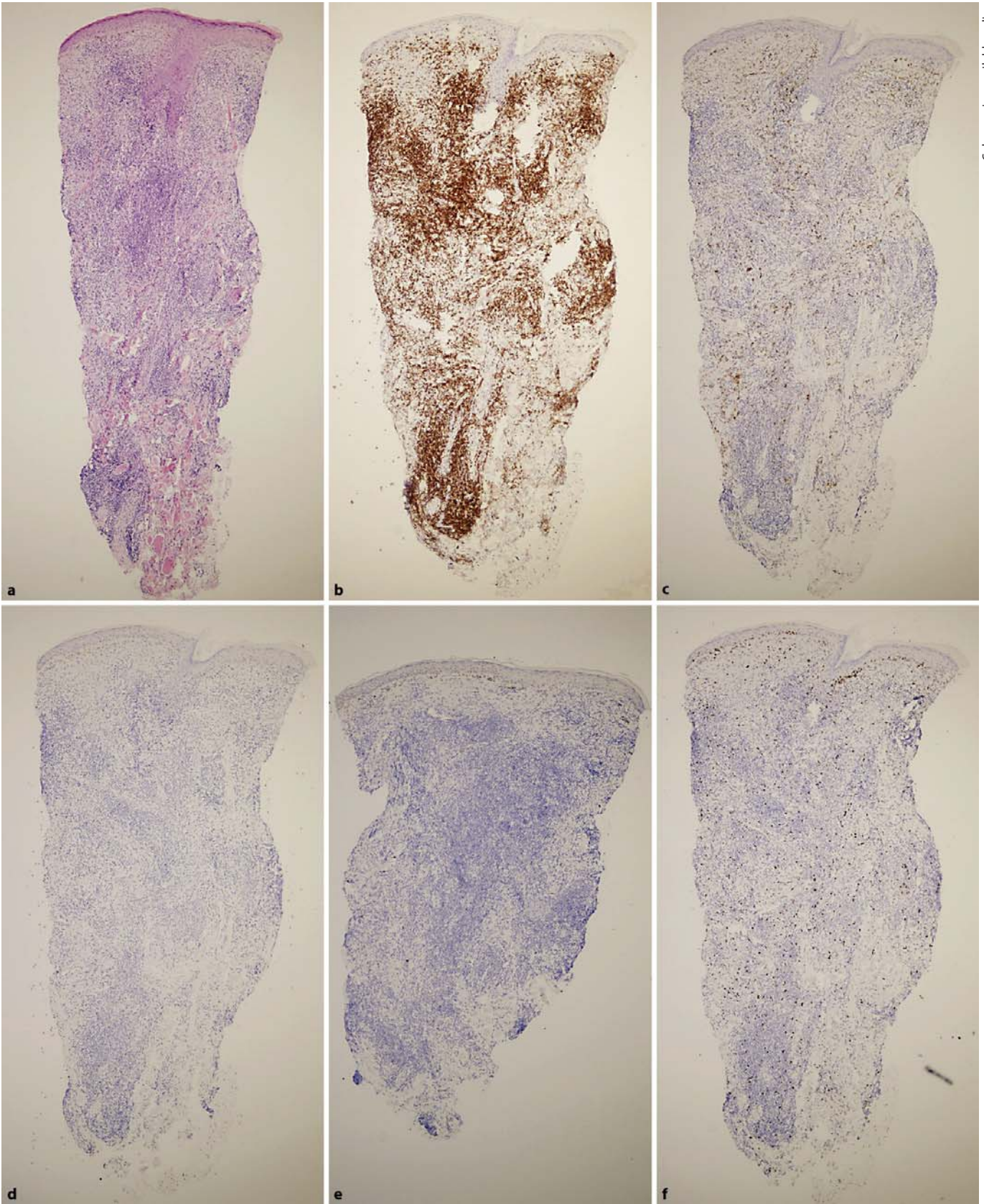
the infiltrated cells strongly expressed CD3 antigen (fig. 2b). The lymphocytes were CD68 negative, but the macrophages partially expressed CD68 (fig. 2c). CD20 and terminal deoxynucleotidyl transferase were negative (fig. 2d, e). Ki-67 had a low proliferation index (fig. 2f). A T cell receptor γ gene rearrangement study was performed on paraffin-embedded skin and showed a polyclonal pattern.

We attempted treatment with a 595-nm pulsed dye laser, but there was no improvement after 4 sessions. Thereafter, the patient underwent intralesional triamcinolone injections at 2- or 3-week intervals for 4 months. The lesion responded gradually and marked clinical improvement was observed (fig. 1b). During a fol-



Fig. 1. Skin lesion before and after treatment. **a** Red-colored and indurated swelling along the lip-liner tattoo site of both lips. **b** Near-complete resolution after intralesional corticosteroid injections for 4 months.

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low-up period of 1 year, the patient showed partial recurrence of the previous lesion.

Discussion

A pseudolymphoma is defined as a process that simulates a lymphoma, primarily histologically, but sometimes clinically. At the time of diagnosis, pseudolymphomas appear to have a benign biologic behavior and do not satisfy the criteria for malignant lymphomas [1]. Tattoo-induced cutaneous pseudolymphomas generally belonged to cutaneous B cell pseudolymphomas [1, 2]. However, tattoo-induced cutaneous T cell pseudolymphoma has been reported previously [3, 4]. In our case, the main infiltrate also presented T cell predominant features. Therefore, adjustment or reclassification of cutaneous pseudolymphomas relating to tattoos is needed.

The pathogenesis of tattoo-induced pseudolymphomas is still unknown. Tattoo dyes contain various kinds of metal compounds and organic substances, such as azo dyes. These components have been suggested to be causative agents for delayed hypersensitivity or some malignancies [5–10]. Among these materials, allergic reactions to certain dyes, especially to red mercury-based dyes, are well known [5, 6]. In most cases, as in the current case, tattoo-induced cutaneous pseudolymphomas are also reported in the red portions of the tattoo [4].

We obtained a sample of the tattoo dye and analyzed the components. We used a furnace and cold-vapor method with an atomic absorption spectrophotometer (AAAnalyst-800; Perkin Elmer, USA). These methods showed the presence of metal iron (12.677 mg/l), copper fumes (1.867 mg/l), metal manganese (0.289 mg/l) and metal cobalt (0.013 mg/l). Other metals, such as mercury, cadmium and titanium, were not detected by our methods. An organic mercury compound had been thought to be the main cause of red tattoo reactions [5], but our methods could not detect one. Abnormal tattoo reactions in the absence of mercury have also been reported [11]. We considered components other than mercury, the detected metals in this case, or an undetected dye to be the cause of the pseudolymphoma.

The time of onset of pseudolymphomas after tattooing ranges from a few months to 12 years [12]. Pseudolymphomas present as nodular growths or swellings. Histopathologic examination of pseudolymphomas reveals a diffuse and dense infiltrate in the entire dermis. The infiltrate is mainly composed of small lymphocytes and macrophages, with some eosinophils and few plasma cells [13]. In the case of B cell dominance, a germinal center or lymphoid follicle may be seen. Immunohistochemical techniques and polymerase chain reaction for T cell receptor or immuno-

Fig. 2. Punch biopsy specimen of the lesion. **a** Diffuse and dense cellular infiltrations through the entire dermis. HE. **b** The majority of infiltrated cells showed strong expression of CD3 antigen. Anti-CD3 stain. **c** Anti-CD68 stain was negative for the majority of lymphocytes, but was partially expressed by macrophages. Anti-CD20 (**d**) and terminal deoxynucleotidyl transferase stains (**e**) were negative. **f** Anti-Ki-67 stain showed a low proliferation index. In all cases, original magnification was $\times 40$.

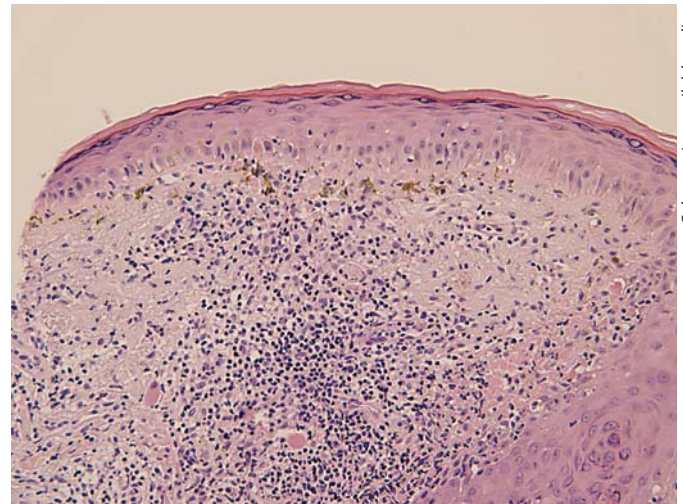


Fig. 3. The inflammatory infiltrate was mainly composed of lymphocytes, but also included macrophages that occasionally contained pigment granules in the upper dermis. HE. $\times 200$.

globulin heavy-chain gene rearrangements can help to differentiate benign from malignant infiltrates.

There is no standard treatment for tattoo-induced cutaneous pseudolymphomas. Topical application or intralesional injection of corticosteroids is generally attempted, but the results are variable. There has been 1 case in which progression of cutaneous pseudolymphoma to lymphoma was reported [14]. Although this malignant transformation is thought to be extremely rare, surgical excision of the tattoo should be considered whenever possible [13]. In our case, surgical excision would have been inadequate due to the cosmetic outcome and functional morbidity. Therefore, corticosteroid intralesional injections were performed and our patient had a good response.

Cosmetic semipermanent tattoos, usually on the face, are different from permanent tattoos on the trunk or extremities. Semipermanent tattoo dye may be implanted in the epidermis and the upper dermis. The depth of the punctures is between 0.6 and 2.2 mm [15]. Conventional permanent tattoos, on the other hand, are implanted to a depth of about 3.5 mm, which is below the mid-dermis. The difference in depth between permanent and semipermanent tattoos may influence the prognosis and therapeutic options for tattoo reactions; however, more cases must be studied to verify this.

To the best of our knowledge, this is the first case of a pseudolymphoma induced by a semipermanent tattoo, and also the first pseudolymphoma to occur on the face. Careful dermatologic examination for complications of a semipermanent tattoo is important, given the increased number of such procedures being performed today.

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