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The Koebner phenomenon on tattoos and piercings in a patient with cutaneous lupus: a case report and review of the literature

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Abstract

The Koebner phenomenon is associated with cutaneous lupus erythematosus (CLE). A 20-year-old woman with a 10-year history of systemic lupus, treated with hydroxychloroquine and methotrexate, presented with features of chronic discoid lupus erythematosus (DLE) on the scalp, at the site of ear piercings, and on the temporal bone at the site of trauma from her jewelry. She also had subacute CLE (SCLE) lesions on old black tattoos. Histology and direct immunofluorescence confirmed CLE. We reviewed 13 cases of Koebner phenomenon on tattoos in patients with CLE (seven men, median age: 31.5 years) and none after piercings. Lesions developed within 1 week to 16 years after tattooing. Lesions may be isolated, precede, or be associated with other CLE lesions. They can appear secondarily on the tattoo. There is no specific color affinity, but cases have shifted from red to black, possibly when mercury was withdrawn from red inks. CLE on tattoos is a rare phenomenon that more often presents with DLE features than SCLE. Patients should be warned of the potential risk of developing lesions on tattoos. Immunosuppressive treatment needs to be taken into account if a patient wishes to get a tattoo. However, tattooing is not associated with severe complications.

Keywords: clinical dermatology, connective tissue, cutaneous lupus, dermatology, epidermal barrier, Koebner phenomenon, lupus, piercing, scars, tattooing

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Introduction

The Koebner phenomenon (KP) has been described in patients with lupus (1). We report here the case of a young woman that developed specific cutaneous lupus erythematosus (CLE) on old tattoos, on ear piercings (helix and ear lobe), and on areas traumatized by the tips of her jewelry. We performed a literature review of past cases of CLE associated with tattoos and body piercings.

Case report

A 20-year-old Creole patient from the island of Réunion (France, Indian Ocean) presented during the austral summer of 2018 with joint pain and a polymorphous skin rash. She never smoked and has had systemic lupus since age 10. She had been taking hydroxychloroquine and methotrexate (10 mg/week) for 5 years without side effects. In December 2018, she presented with wrist pain, diffuse hair loss, and cutaneous lesions of various aspects. Scaly psoriasis-like patches, evocative of subacute cutaneous lupus erythematosus (SCLE), were located on healed black tattoos: an old tattoo on the left arm and on the neckline from 2017 and 2018. They had been done by two different tattoo artists. Patches were distributed on photo-exposed areas. They persisted over time, without a tendency to spontaneous regression, and were located only on tattoos (Fig. 1). There were no CLE lesions on the rest of the body except on the scalp and ears. Multiple brown macules and dark erythematous patches with white central atrophy favoring discoid lupus erythematosus (DLE) were located on both ears, behind the ears, and on the scalp. Two small patches of DLE were visible on the temporal bone just at the opposite of the helix and ear lobe piercings (Figs. 2 and 3). All the lesions appeared at the same time. Skin biopsies from the scalp confirmed the diagnosis of lupus with a lupus band on the direct immunofluorescence.

Figure 1 | Scaly psoriasis-like lupus patches located on some parts of a black tattoo on the left arm.

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Figure 3 | Lesions on the temporal bone of the skull, corresponding to areas traumatized by the tips of the patient's jewelry (red arrows).

Figure 2 | Atrophic and scaly pigmented lesions of the helix, some of which are around the piercings.

Table 1 | **Review of reported cases of cutaneous lupus on tattoos from the literature.**

Tattoo age	Age at diagnosis and sex	Skin phototype	Delay of onset after tattooing / evolution before consultation	Lupus type	Photo-sensitivity/ photo-induced flare	Pigment color	Cutaneous lupus elsewhere on plain skin	Evolution after treatment	Report (year; reference)
19 y	35, M	NA, fair, "bohemian"	16 y / 3 y	DLE	No	Red	No	Slight improvement: intramuscular injections of crude liver and bismuth subsalicylate, and intravenous injections of gold sodium thiosulfate	Hall (1943; 4)
6 y	36, M	NA, fair	4 y / 2 y	DLE	Yes*	Red	Yes	Efficacy of intramuscular injections of bismuth subsalicylate	Madden (1949; 5)
7 y	24, M	NA	7 y / 2 mo	DLE	NA	Red	Yes	NA	Rook (1951; 6)
12 y	30, M	Fair	11.5 y / 1 mo	DLE	Yes	Red	Yes	NA	Lubeck et al. (1952; 7)
15 y	35, M	Fair	NA	DLE	Yes	Red	Yes	Recalcitrant tattoo lesions; all other lesions have become inactive under topical and intralesional steroids, sun-screens, and oral antimalarials	Fields et al. (1968; 8)
NA	NA, M	NA	NA	DLE	NA	Red	NA	NA	Pavithran (1983; 9)
NA	33, F	Fair	NA	SCLE	NA	Multicolored, green or red (?)	NA	NA	Canvin et al. (2002; 10)
1 y	27, F**	Dark, V	1 wk / 1 y	DLE	NA	Dark	NA	NA	Jolly (2005; 11)
7 mo	29, F	Fair	3 wk / 6 mo	SCLE	No	Black	Yes	Efficacy of hydroxychloroquine and sunscreen	La Placa et al. (2009; 12)
5 y	38, M	Fair	5 y / 1 mo	SCLE	Yes	Black	Yes	NA	Kluger (2014; 13)
3 y	33, F	Fair	2 y 4 mo / 7 mo	DLE	NA	Red	No	NA	Ronkainen et al. (2017; 14)
NA, "years"	20s, F	Fair***	NA / 1 y	DLE	NA	Black	Yes	NA	Wang et al.(2019; 15)
NA	20, F	Dark, V	NA / 6 mo	SCLE	Yes	Black	Yes	Improvement with oral corticosteroids and hydroxychloroquine	Present case

y = year(s), mo = month(s), wk = week(s), NA = not available, F = female, M = male, V = Fitzpatrick type V, DLE = discoid lupus, SCLE = subacute cutaneous lupus.
*Photo-induced flare on the face associated with a flare on the tattoo despite a leather jacket, **Systemic lupus, ***10-year history of an unspecified autoimmune disease manifesting predominantly as interphalangeal joint polyarthritis.

Native anti-DNA antibodies were highly elevated at 169 U/ml (n < 10), with anti-SSA antibodies at 151 U/ml (n < 7), anti-Sm at 25 U (n < 7), and anti-U1-RNP positive at 19 U/ml (n < 5). A circulating lupus-type anticoagulant and polyclonal hypergammaglobulinemia at 20 g/l (n < 10) were detected. Complement fractions C3 and C4 and total CH50 were normal. Whole-blood hydroxychloroquine levels were low (0.11 mg/l, n > 0.75). The patient acknowledged poor adherence to treatment. CLE was confirmed not only on the skin, but also on the joints with symmetrical distal arthralgia without arthritis. The systemic lupus erythematosus disease activity index (SLEDAI) was 6 (moderate activity). Oral corticosteroid therapy at 10 mg daily improved the symptoms. The patient was reminded of the importance of photoprotective measures and the need for regular intake of hydroxychloroquine.

Discussion

The case presented here is notable for multiple KP on tattoos and piercings, both for SCLE and DLE. Development of CLE on areas traumatized by KP has been observed on rare occasions (1). In fact, KP during lupus is considered questionable according to the Boyd–Nelder classification (Category IV) (2). However, the occurrence of DLE on tattoos has been known since the 1940s (3). Twelve other cases were identified in the literature (using the following keywords: "Tattoo or Tattoos or Tattooing" AND "Lupus" with no other restriction on a Pubmed, Scopus, and Google search; Table 1) (4–15). One of the articles was not accessible (9). Patients may initially report an "irritation" on the tattoo (4–6). CLE on tattoos may be isolated (4, 14), precede (8, 12), or be associated with other CLE lesions (5, 6), or it may appear secondarily on the tattoo (7, 11, 13). The clinical aspect most often remains typical with erythematous, papular, or patchy pruritic lesions with follicular dilations and keratotic plugs on the surface. Sun exposure may be responsible for local flares with a notable photo-distribution of the lesions (5, 7). Histology confirms the diagnosis. Nine cases of DLE have been reported to date. KP has been described following traumas, scratching, surgery scars, contact dermatitis, application of liquid nitrogen, intramuscular injection, and other incidents (1, 16). The first observations described lesions on red tattoos and on photo-exposed areas, and so the role of tattoo pigment was promptly discussed. In the 1950s, red pigments historically contained cinnabar (mercury sulfate), cadmium selenide, and sienna. Rook and Thomas (6) obtained a positive patch test for mercury, and Fields et al. (8) tested a patient negative for mercury. Mercury may have played a photosensitizing role. Fields et al. triggered a new flare in the red of a tattoo 3 months after photo-exposure (8). Madden's patient had a flare on his tattoo shaded from the sun during a photo-induced flare on the face (5). The composition of inks has changed, and mercury should no longer be found in professional inks. Interestingly, most recent cases are no longer on red tattoos, but on black ones.

Several cases of SCLE have also been reported (10, 12, 13). The coincidental location of a CLE lesion on a tattoo cannot be formally ruled out, especially when there is a single lesion partially affecting a tattoo. Nevertheless, KP on tattoos is rarely "complete" because the rash can be restricted to some areas of the drawing. Lastly, cases of tattoo reactions with a "lupus-like" pattern upon histology have been described. The authors could not conclude with certainty whether the patients had a genuine CLE on tattoos or an allergic reaction to ink (17, 18). In his original case presented to the Los Angeles Dermatological Society, the diagnosis of CLE was disputed and Hall himself explained that his case could be either lupus or hypertrophic lichen (4). Ronkainen reported a case of histological DLE-reaction restricted to the red part of a tattoo without any other skin symptoms or signs of biological autoimmunity (14). Lupus-like allergic reactions (interface dermatitis, perivascular and peri-adnexal lymphocyte infiltration, and mucin deposits) may occur on the red part of tattoos. To the best of our knowledge, in no case in the literature has direct immunofluorescence been carried out on a lupus-like tattoo reaction.

The occurrence of CLE on tattoos remains extremely rare. In their series of 493 tattoo reactions, Serup et al. did not report any cases (19). To date, we have not seen any cases of this type at our "tattoo" consultation at Bichat–Claude Bernard Hospital. In our retrospective series from Finland (20), we excluded the case of a 28-year-old patient with DLE due to insufficient clinical and pathological data on a tattoo reaction.

Our patient had also developed lupus lesions at the site of piercing of the helix as well as at sites traumatized by the tips of her jewelry. We have not found any similar cases of CLE on piercings in the literature.

According to a recent Spanish study, 19% of patients with systemic lupus have one or more tattoos (20). In this review, only two patients had systemic symptoms. One had a known history of systemic lupus (11), and a young woman in her 20s had a 10-year history of polyarthritis treated by various immunosuppressive treatments (15).

Lupus reference centers are certainly confronted with the question of tattoos. Patients with chronic or systemic lupus should be warned of the potential risk of developing tattoo lesions. However, if the patient cannot be dissuaded from getting a tattoo, this procedure should be discouraged during the active phase of the disease. Finally, patients with systemic lupus should seek advice from their attending physician, particularly if they are taking an immunosuppressive treatment that would expose them to a risk of delayed healing (e.g., high-dose corticosteroid therapy or biotherapy) or infection (22).

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