Transient Immunoreactivity After Laser Tattoo Removal: Report of Two Cases

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Background and Objective: Laser tattoo removal is one of most commonly used indications for medical lasers. Professional tattoos contain a multitude of potentially immunogenic chemicals that are released or modified by laser treatment. We studied potential immunologic reactions following laser tattoo removal.
Study design/Patients and Methods: Case report of two patients with immunologic reactions after laser tattoo removal.
Results: Two patients developed transient immunoreactivity that presented as regional lymphadenopathy after laser tattoo removal of professional black and blue-green tattoos. These reactions resolved without any complications.
Conclusions: Tattoo pigments released or modified by laser therapy may trigger transient immunoreactivity in susceptible individuals. Lasers Surg. Med. 40:231–232, 2008. © 2008 Wiley-Liss, Inc.

Key words: immune activation; laser; lymphadenopathy; removal; tattoo

INTRODUCTION

Laser tattoo removal is one of most commonly used indications for medical lasers. Approximately 24% of Americans age 18–50 have tattoos [1], and many of the people with a tattoo seek to have it removed at some point in the future. Reactions after laser tattoo removal are rare, but may increase in number and variety as the popularity of skin art increases, followed by the increased need for removal. We describe two cases of transient immunoreactivity presenting as regional lymphadenopathy that occurred after laser treatment of black and blue-green tattoos, and discuss possible mechanisms for this phenomenon.

CASE REPORTS

Patient #1

Twenty eight-year-old white male with a 9×8 cm professional black tattoo on the posterior scalp and upper neck underwent the first tattoo removal treatment with Q switched Nd:Yag laser, 4 mm spot and 4 J/cm^2, with the endpoint of whitening. He received a subcutaneous injection of 1% Lidocaine with Epinephrine prior to procedure and an application of halobetasol cream after the procedure. Within several days after the treatment, he noted prominent swelling and tenderness of one of his posterior neck lymph nodes. Notably, he also had symptoms of an upper respiratory infection at this time, with sore throat and nausea. The swelling and tenderness resolved several weeks later. The patient did not return for further treatment of this tattoo.

Patient #2

Twenty one-year-old white female with a blue-green professional tattoo on the lower back underwent her fourth tattoo removal treatment with Q switched Ruby laser, 6.5 mm spot and 4.3 J/cm^2, with the endpoint of whitening. She received a subcutaneous injection of 1% Lidocaine with Epinephrine prior to procedure and an application of halobetasol cream after the procedure. Within several days after treatment, she noted enlarged pelvic lymph nodes. There were no constitutional symptoms. She consulted a gynecologist. A work-up for an infectious cause was negative, and the lymphadenopathy resolved after a short course of antibiotics. She had mild blistering of the treatment site, which resolved without scarring. Interestingly, she had a recurrence of the pelvic lymphadenopathy after each of the two subsequent laser treatment sessions to the same tattoo. It started on day 2 after the session, and resolved within 2 weeks without any treatment. Its severity was comparable to the initial episode.

DISCUSSION

Regional lymphadenopathy that is spatially and temporally related to laser tattoo removal most likely represents transient immunoreactivity to tattoo pigment or to the process of laser tattoo removal. This is a new complication of laser tattoo therapy, and should be recognized by clinicians and explained to patients prior to laser treatment. Such lymphadenopathy in our patients could also stem from other possible factors, including an inflammatory response to a newly created wound after laser treatment, a mild

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infection of the treated area, or a concurrent respiratory or pelvic infection. Because of the number of possible triggers, such reactions after laser tattoo removal should be examined more thoroughly in prospective studies that involve a large number of patients.

The exact mechanism of such immunoreactivity in our patients is unclear. It most likely involves the migration to regional lymph nodes of laser-induced pigment microparticles or complexes of microparticles with endogenous molecules, as part of an acute inflammatory process following the trauma of laser-skin and laser-pigment interaction. Indeed, laser treatment may 'liberate' these inks to travel out of the skin, a process facilitated by the influx of antigen-presenting cells and phagocytes, and by the increased vascular permeability of the inflamed tissue. Once in the lymph node, this particulate matter may represent an immunogenic or antigenic stimulus in an already inflammatory milieu, leading to immune activation and the resultant lymphadenopathy.

As suggested by our cases, this inflammatory cascade will likely self-resolve, with the clinical outcome of resolved lymphadenopathy. However, this raises the possibility that a similar event may occur with greater severity of symptoms if the immune system is re-challenged with the same immunogenic stimulus upon successive laser tattoo removal sessions. This phenomenon is clinically distinct from the acute urticarial response reported by England et al., in a 26-year-old woman 30 minutes after tattoo removal with the Q switched Nd Yag laser. This immediate hypersensitivity reaction was successfully treated, and subsequently prevented, with a 3-day course of prednisone, cetirizine, and ranitidine [2].

The immunogenic potential of tattoo placement and of various tattoo pigments has been widely reported in the literature. Acute lymphadenopathy from tattoo placement is a well-known phenomenon that stems from local inflammation and probably resolves spontaneously [3]. Additionally, tattoo pigment can elicit localized pseudolymphomatous hypersensitivity reactions that may show histologic features of Spiegler-Fendt pseudolymphoma [4–7], and to elicit granulomatous and sarcoidal inflammatory responses in situ [8]. Furthermore, the intracutaneous tattoo pigment may trigger reactive lymphadenopathy when it migrates to the regional lymph nodes [3]. Zirkin et al. [9] have described a young man who developed left inguinal lymph node enlargement several years after getting a tattoo placed near the affected node. On examination of the extirpated lymph node, it contained dark tattoo pigment. Jack et al., [3] have demonstrated tattoo ink in an enlarged lymph node that mimicked metastatic melanoma.

Accordingly, laser tattoo removal may induce an analogous process, where selective photothermolysis of tattoo pigments elaborates new particles in an inflammatory environment that are transported to the draining lymph node via the local lymphatic channels. These pigments induce immunoreactivity that presents clinically as lymphadenopathy. Since most patients experience either no lymphadenopathy or a subclinical degree of lymphadenopathy after laser tattoo removal, such immunoreactivity is certainly unusual. Our cases demonstrate that even when the lymphadenopathy is clinically apparent, it may resolve without serious sequellae in the short term. Clearly, longer follow-up is necessary to determine whether the above reactions are truly benign and self-limited. Risk of recurrence with further treatments is always a possibility, and clinicians should anticipate such events and warn patients about this side effect.

More worrisome is the unknown long-term risk posed by the dissemination of tattoo microparticles, either alone or complexed to endogenous proteins, throughout the system. Since tattoo inks are unregulated by the FDA, some dyes and pigments may be intrinsically carcinogenic or highly immunogenic, or may be made otherwise harmful by laser-pigment interactions. Therefore, more effort should be made to ensure the safety of tattoo inks and laser tattoo removal.

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