

## CO<sub>2</sub> Laser Treatment Causes Local Tattoo Allergic Reaction to Become Generalized

Sir,

Options for laser removal of tattoos involve the Q-switched lasers and the CO<sub>2</sub> laser. The Q-switched ruby, alexandrite and Nd:yag lasers have all been shown to be effective in tattoo removal, with minimal scarring (1–3). Q-switching lasers remove tattoos by producing selective photothermolysis of the pigment without thermal damage to surrounding structures (1, 4). Results of the Q-switched lasers can be quite variable, depending on the quantity of tattoo pigment, its composition and depth in the dermis (1, 5).

The CO<sub>2</sub> laser employs an entirely different mechanism, which utilizes destruction of overlying epidermis and part of the dermis, allowing for subsequent osmotic removal of pigments after tissue destruction. Thin layers of tissue are vaporized and wound healing occurs by secondary intention, leaving a scar (6).

Recently Ashinov et al. (7) reported two cases in which local and systemic allergic reactions were precipitated after treatment with ruby and Nd:yag Q-switched lasers. We here report, to the best of our knowledge, the first case of systemic reaction occurring after CO<sub>2</sub> laser tattoo removal.

### CASE REPORT

A 19-year-old college student was referred to the dermatology office for evaluation of a rash around a tattoo. Erythema, vesicles and edema had developed a few weeks after a tattoo containing green and yellow dyes had been placed on her right lower leg. For one month the patient had been experiencing itching, oozing and crusting, which did not respond to oral antibiotics prescribed by her primary care physician. Her past medical history was significant for allergic contact dermatitis to "cheap jewelry", but negative for atopy, hives and upper respiratory problems. The presumptive diagnosis of allergic contact dermatitis to tattoo dye was made. She was given a 2-week tapering dose of prednisone and topical steroid cream. She was informed that if the reaction persisted, the tattoo would need to be removed surgically. One month later the patient came back to the dermatologist, stating that prednisone made the rash go away. However, once she stopped taking systemic steroids the rash came back. The patient was given an option to remove the tattoo by either Q-switched or CO<sub>2</sub> laser surgery treatment. She and her primary care physician requested CO<sub>2</sub> laser treatment. The tattoo was removed in the dermatology office without any complications. Intraoperatively tattoo dyes were found to extend into deep reticular dermis; however, the wound healed well with good cosmetic results. Approximately 3–4 weeks after laser surgery the patient developed an eczematous reaction around the wound site, which within a matter of days progressed to generalized urticaria. The urticaria lasted for approximately 3 months and finally resolved on its own.

### DISCUSSION

Occasionally, local allergic reactions occur to tattoo pigment. Reactions to red, purple, green and blue tattoo pigments have all been reported (8). Blue tattoo reactions have been linked to cobalt (9), yellow to cadmium sulfide and green to chromium oxide (10). Recent reactions to black tattoo pigment may link the response to carbon as well as iron (8). In tattoo

reactions, patch testing may not be effective since the inflammatory response is triggered by material within the dermis. This is unlike contact dermatitis, in which antigen-presenting cells within the epidermis trigger the reaction (10).

In the category of systemic reactions, one case of a generalized eczematous eruption after laceration of a tattoo in a patient shown to be sensitive to mercury occurred (7). Recently, as mentioned above, two cases in which local and systemic allergic reactions were precipitated after treatment with the ruby and Nd:yag Q-switched lasers were reported (7). In both cases no reaction was present prior to treatment.

To date there have been no previously reported cases of systemic allergic reaction following tattoo removal with CO<sub>2</sub> laser. This case represents an important complication of CO<sub>2</sub> laser tattoo removal, which clinicians should be aware of. It is possible that a small zone of heat conduction may have altered local tissue factors or pigment-containing cells in such a way as to allow them to become extracellular, leading to systemic uptake of the allergen which initiated the response. Since CO<sub>2</sub> laser energy is not absorbed by tattoo pigment, no alteration in the allergen is likely to have occurred. Though the occurrence of systemic reaction after tattoo removal is certainly very rare, with the current popularity of tattooing and the increasing availability of lasers for their removal, more cases may occur in the future.

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