

# Ablative Fractional CO<sub>2</sub> Laser may be a Novel Treatment for Tattoo Allergic Reaction

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## Abstract:

A 47 year-old woman presented with eight-month history of tattoo allergic reaction of eyebrows after botulinum toxin A injection that was resistant to oral, topical and intralesional injection of corticosteroids. Multiple sessions of treatment with CO<sub>2</sub> fractional laser resulted in significant flattening of allergic papules and plaques as well as reduction of tattoo pigmentation.

**Keywords:** CO<sub>2</sub> laser; tattoo; allergic reaction

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## Case Report

A 47 year-old woman referred to our clinic with complaint of eyebrows' tattoo reaction following botulinum toxin A (BTA) injection. She had previous history of BTA injection for headache and facial wrinkle treatment every 6-8 months from five years ago and never experienced a problem. No remarkable history of previous allergic disorders was found.

Within three days of taking last BTA injection about one years ago (probably non-FDA approved BTA), she developed severe edema of the face. Her black pigmented eyebrows' tattoo swelled and became red, pruritic and painful. Retraction of the eyelids and eyebrows led to the eye occlusion disturbance and blurred vision. At once, she took high doses of oral and parenteral corticosteroids that reduced the facial edema while the eyebrows' tattoo reaction persisted. After that she underwent monthly intra-lesional injection of triamcinolon in combination with daily 15-25 mg oral prednisolon therapy for eight months that only resulted in minimal improvement of tattoo allergic reaction.

Eight months after onset of eyebrows' reaction, the patient referred to our clinic. At the time of our first

visit, physical examination revealed the presence of multiple grouped red eczematous and indurated papules and plaques confined to her eyebrows (Figure 1).

Non-tattooed skin was intact. She was examined for sign and symptom of related disorders and was



**Figure 1.** Indurated red papules and plaques due to reaction to the tattoo ink.

clinically normal. Thorough clinical and para-clinical evaluation such as thoracic and abdominal imaging as well as ophthalmologic examination did not show evidence of sarcoidosis. Similarly, all hematologic and biochemical assessments including C-reactive protein, erythrocyte sedimentation rate and angiotensin-1 converting enzyme level were normal.

In consequence of resistance to conventional therapies, ablative fractional CO<sub>2</sub> laser therapy was implemented as a plan for tattoo reaction treatment. The patient underwent seven sessions of ablative fractional CO<sub>2</sub> laser therapy using eCO<sub>2</sub> (Lutronic®, Seoul, Korea) with 100 w power every three weeks. No pre-operative preparation was carried out and mineral water spray in combination with zinc oxide ointment was recommended post-operatively for five days. No additional therapy was performed concurrently.

In each session of treatment, the clinical evaluation of the lesions showed significant improvement of tattoo reaction including reduction of swelling, redness and induration of papules in addition to decrease in the density of tattoo pigmentation. One month after the last treatment, near total flattening of tattoo allergic reaction and depigmentation of the ink was observed (Figure 2).

Three-month follow-up visit revealed clinical remission of the eyebrows' tattoo reaction, while the patient was highly satisfied with the result.

## Discussion

In this case report, successful treatment of a tattoo allergic reaction with ablative fractional CO<sub>2</sub> laser was illustrated. The utility of lasers in the treatment of



**Figure 2.** Near total clearance of the tattoo reaction after 7 sessions of fractional CO<sub>2</sub> laser.

tattoo allergic reaction has caused major controversy. Although there have been some reports of allergic reaction of tattoo following laser removal, it was shown that laser therapy can be of great value in the suppression of tattoo hypersensitivity reaction.

Two cases of localized and widespread allergic reactions after removal of tattoos with two types of Q-switched lasers were described by Ashinoff, et al. (1) which is confirmed by the observation of England, et al (2). They reported a hypersensitivity skin reaction immediately after treatment of tattoo with Q-Switched Nd:YAG laser. It is suggested that fragmentation of ink particles within dermal cells due to rapid thermal expansion, results in exposure of immune system to extracellular pigments that ultimately flare up a cascade of immune hypersensitivity reaction (3). However, in an open-label trial by Antony and Harland (4), significant improvement of lesions and reduction of red ink within tattoos with Q-switched 532nm Nd: YAG laser was shown in seven patients. Similarly, Dave and Mahaffey (5) have been successful in the treatment of an allergic reaction in a red tattoo using the Nd: YAG laser.

Recently, CO<sub>2</sub> Lasers has been proposed for the treatment of allergic reaction to tattoos, although limited evidence is available. The case we reported was resistant to long term use of systemic and intra-lesional corticosteroid therapy, while seven sessions of fractional CO<sub>2</sub> laser therapy was accompanied by complete flattening of indurated allergic reaction of tattoo. The maintenance of response besides no adverse effect should be noted. It is found that intra-cutaneous fine channels with ablative CO<sub>2</sub> fractional laser can create a pathway for trans-epidermal elimination of tattoo pigments that is observed by the substantial reduction of tattoo color (6). Interestingly, Brodell reported a case of tattoo reaction that had been treated using CO<sub>2</sub> laser, while having no problem with retattooing (7).

## Conclusion

It can be concluded that the ablative CO<sub>2</sub> fractional laser can be an effective alternative in the treatment of tattoo allergic reaction which appears to have much lower side effects compare to corticosteroid therapy. Unfortunately, lack of histopathologic examination to identify the exact type of allergic reaction was the main limitation that this case report has encountered. Further randomized clinical trials to evaluate the efficacy and

safety of ablative CO<sub>2</sub> fractional laser in the treatment of tattoo allergic reaction is required.

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