laser in IM-associated ADM. Therefore, our report supports the efficacy of picosecond lasers as a viable option of treatment. However, it must be noted that continued use of IM may contribute to recurrence and patients may require repeated laser therapy subsequently.

In summary, this article demonstrates another instance where picosecond 755-nm alexandrite lasers can be used in the management of IM-associated ADM. It is a safe and effective tool, with minimal risks of dyspigmentation and scarring.

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Safety of a Perfluorodecalin-Infused Silicone Patch in Picosecond Laser-Assisted Tattoo Removal: A Retrospective Review

Q-switched (QS) and picosecond lasers can effectively and safely remove unwanted tattoo pigments.[1] During laser treatment of tattoos, immediate whitening reactions occur as a result of thermally induced cavitation bubble formation.[2,3] The concomitant increase in optical scattering temporarily limits the penetration of sequential laser passes.[2,3] Perfluorodecalin (PFD), a metabolically inert fluorocarbon with high gas solubility and the ability to enhance optical clarity, facilitates rapid sequential laser passes without the need to wait 20 minutes for the microcavitation bubbles to naturally dissipate.[3–5] Studies have shown that the use of a PFD-infused silicone patch during laser-assisted tattoo removal with a 755-nm QS alexandrite laser enables multiple passes to be made in a single treatment session and is safe, effective, and well tolerated.[4,5] Additional potential benefits may include thermal protection of the epidermis and reduction in laser fumes and debris from the procedure. Although anecdotally reported, there have been no studies examining the use of PFD patch for laser-assisted tattoo removal with other lasers. This study assessed the safety of treating tattoos with picosecond lasers using multiple passes with PFD patch.

Methods

Asentral Institutional Review Board (Newburyport, MA) approved this retrospective, nonrandomized study of all eligible patients treated for unwanted tattoos using picosecond laser in combination with PFD patch between January 1, 2017, and June 30, 2017, at a high-volume laser and dermatologic surgery center. Only patients who underwent treatment with PFD patch were identified and their data recorded. The primary outcome measure is adverse events. Inclusion criteria included age ≥18 years and laser treatment of unwanted tattoo using the PFD patch. Information extracted from the medical record includes patient demographics (age, sex, and skin type), treatment location, tattoo characteristics (color and history of previous treatment), laser treatment parameters (device, wavelength, fluence, pulse duration, and number of passes), and adverse events. Adverse events were evaluated immediately after treatment and at the first follow-up visit, which usually occurred between 4 to 8 weeks after initial treatment.

Forty-five consecutive patients who received PFD patch-assisted picosecond laser tattoo removal were included in the study. Fourteen (31.1%) patients were treatment-naive, and the remaining 31 (68.9%) patients had previously been treated with a different laser or same laser without PFD patch. One patient with type V skin developed hypopigmentation from previous treatments. The distribution of tattoos included 2 on the neck, 15 on trunk, 20 on upper extremities, and 8 on lower extremities. Twenty-nine (64.4%) patients had black tattoos, and the remaining patients had multicolor tattoos with mixtures of black, blue, green, red, and yellow ink.

All patients received local anesthesia before the procedure using 1% lidocaine with epinephrine. The tattoo was pretreated with residual liquid PFD from the device packaging using cotton swabs. The PFD-infused patch was then promptly applied and laser treatments performed. Some patients were instructed to apply a topical mid-potency corticosteroid twice daily for 3 days after treatment. None received antiviral prophylaxis.

The 755-nm and 532-nm picosecond lasers (Cynosure, Westford, MA) were used in this study. All patients were treated with the 755-nm picosecond laser. Two patients also received treatment with the 532-nm wavelength at the same treatment session. For 755-nm picosecond laser treatment, fluences of 2 to 6.37 J/cm^2 and spot size of 1.5 to 4 mm were applied, with higher fluences used for smaller spot sizes. For 532-nm picosecond laser treatment, fluences of 1.12 J/cm^2 and spot size of 1.5 to 2 mm were applied.

Results

The patients had a mean age of 35.5 years and consisted of 16 men and 29 women. The numbers of patients with Fitzpatrick skin types I, II, III, IV, and V were 7, 14, 15, 6, and 3 respectively. The mean number of passes per treatment session was 2.6 (range of 1–4 passes). Treatment providers determined the optimal number of passes for any particular tattoo. Seventeen (37.8%) patients had one treatment session. Of the 28 (62.2%) patients with at least 2 picosecond laser treatment sessions with PFD patch, the mean number of treatment sessions was 2.8 (range of 2–5 treatments).

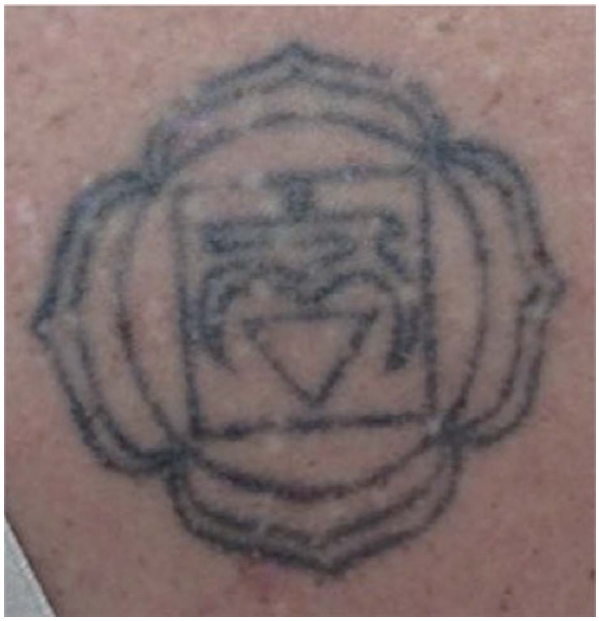

Figure 1. Unwanted black tattoo before treatment.

Laser tattoo treatments with multiple passes using the PFD patch were well tolerated, safe, and effective (Figures 1–4). No dyspigmentation, scarring, textural changes, or unanticipated adverse events directly related to the treatment were observed. In addition, no treatments were discontinued due to excessive

Figure 2. Unwanted black tattoo after treatment.

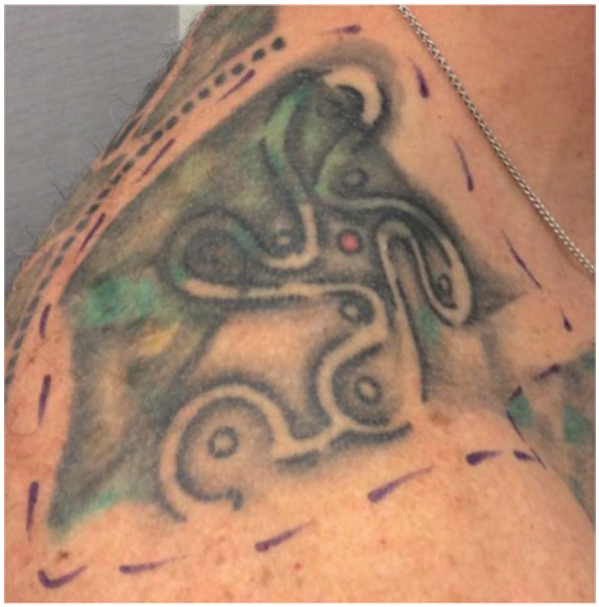

Figure 3. Unwanted multicolor tattoo before treatment.

discomfort. One patient developed urticaria 2 weeks after treatment with the 755-nm picosecond laser. He denied history of urticaria, and it did not recur with subsequent treatments.

Discussion

Although QS lasers have traditionally been the workhorses in laser tattoo removal over the past 2 decades, newer picosecond lasers have demonstrated enhanced clinical efficacy. Because both QS and picosecond lasers produce transient epidermal whitening with treatment, utilization of PFD to perform multiple passes and circumvent the subsidence interval after a laser pass is desirable. The results in this study demonstrated that multiple passes with PFD patch can be used in various skin types and body locations in combination with picosecond lasers to treat unwanted black or multicolor tattoos safely and efficiently. Treatments were well tolerated by patients and there were no occurrence of adverse reactions, such as dyspigmentation, even in darker skinned individuals. One patient who had developed hypopigmentation with previous laser treatments did not develop new dyspigmentation after further treatment with multiple passes using the PFD patch.

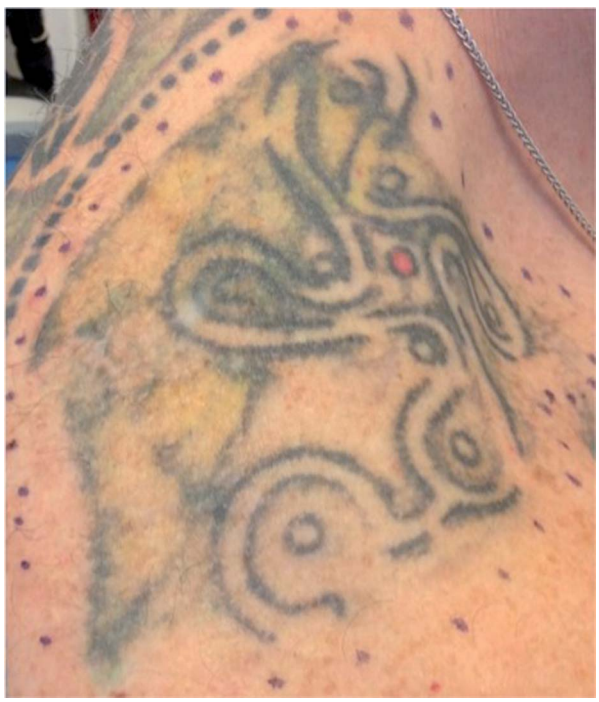

Figure 4. Unwanted multicolor tattoo after treatment.

There are limitations to this study. This was a retrospective chart review and therefore a reporting bias may exist. With a short follow-up period, there may be long-term adverse events that are not captured, but it was reassuring that 28 patients who had multiple laser treatments with PFD patch did not develop any adverse reactions. In addition, the sample size for 532-nm picosecond laser was small.

In conclusion, this retrospective study demonstrated that single or multiple passes of the 755-nm and 532-nm picosecond lasers may be safely used in combination with PFD patch to treat black or multicolor tattoos on different body sites in patients of diverse Fitzpatrick skin types. Notably, there was absence of post-treatment dyspigmentation.

Acknowledgments Patients provided written consent for the use of their images.

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Laser Depigmentation in Extensive Vitiligo

Vitiligo is one of the most common acquired depigmenting diseases and is characterized by well-defined depigmented macules and patches on the skin. This disorder is classified into segmental and the more common nonsegmental categories. Vitiligo universalis is a subtype of nonsegmental vitiligo and is defined as nearly complete depigmentation of the skin.[1] Quality of life may be profoundly impaired in these patients, and thus, effective treatment strategies are critical to improving psychological well-being. Depigmentation strategies, such as monobenzyl ether of hydroquinone, are used in patients with extensive vitiligo where repigmentation therapies are not a viable option, but this treatment can cause several adverse effects, such as contact dermatitis.

Because chemical depigmentation is time-consuming and fraught with potential adverse events, laser therapy is an attractive alternative treatment option, especially when only a few areas of depigmentation are requested. Several lasers have been reported as useful for depigmentation in vitiligo, including the Q-switched 694-nm ruby laser (QSRL) and Q-switched 755-nm alexandrite laser (QSAL).[2,3] In this report, we confirm the safety and efficacy of the QSRL and QSAL for depigmentation in vitiligo and demonstrate that the novel picosecond 755-nm alexandrite laser (Picosure; Cynosure, Boston, MA) is also a viable treatment alternative.

Patient 1

A 54-year-old Indian woman with a long-standing history of stable vitiligo universalis presented for evaluation and treatment of residual pigment located on the dorsal hands. Although the remaining pigment caused her significant embarrassment, the patient denied the previous use of depigmenting therapies. Examination of the hands revealed brown patches and macules on the lateral fingers and web spaces on a background of otherwise depigmented skin. After discussion of treatment options with the patient, therapy with the QSRL (WaveLight Laser Technologie AG, Erlangen, Germany) was selected. Pretreatment consisted of applying a compounded 23% lidocaine/7% tetracaine topical anesthetic ointment to the hands for 1 hour before the procedure. Laser treatment to the residual pigment on the hands was initiated using the QSRL with a 5-mm spot size and fluence of 6 J/cm^2 for 613 pulses at 2-Hz and 20-ns pulse duration. The patient reported mild pain during the procedure and had transient postprocedure blistering, erythema, and crusting. At the 2-month follow-up, the patient had an 85% improvement in depigmentation after 1 treatment session (Figure 1).

Patient 2

A 59-year-old Caucasian man with a 15-year history of vitiligo universalis presented for treatment of