

## CASE REPORT

# Traumatic tattoos induced by IPL hair removal: A rare case report

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**Abstract**

Using blue marker on the patient skin before IPL can lead to tattoos on the marked areas that must be avoided.

**KEYWORDS**

case report, IPL, traumatic tattoo

## 1 | INTRODUCTION

Laser and intense pulse light (IPL) therapies are widely used for the removal of undesired excessive hairs. However, the occurrence of complications is undeniable. This article presents a rare condition that appeared after IPL therapy for hair removal. The patient got traumatic tattoos 1 month after IPL for hair removal.

Tattoos are defined as the introduction of exogenous pigments into the dermis in order to produce a permanent design. This process may occur unintentionally or maybe deliberately administered for cosmetic or medical reasons.<sup>1</sup>

As with any type of trauma to the dermis, the body's first response is to stop the resultant bleeding from forming a clot. Then, the skin tissue swells (edema), followed by a migration of immune system cells to the wound site (neutrophils and macrophages) to phagocytose foreign substances, cell debris, and microbes. Any damaged collagen in the wounded papillary dermis is then repaired through the action of fibroblasts, ultimately laying down scar tissue. Over long periods, the tattoo ink particles can gradually move to the deeper dermis (ie, reticular dermis), which gives the tattoo a faded and blurred appearance.

Notably, after tattoo ink insertion, associated pigment particles can be found to leave the skin via its vasculature and enter the lymphatic system. Adverse reactions are relatively rare and generally unpredictable and predominantly include immune-mediated reactions and skin infections.<sup>2</sup> Red ink is associated more frequently with long-term reactions, including granulomatous and pseudolymphomatous phenomena or morphea-like lesions and vasculitis. Exacerbation of preexisting psoriasis, atopic dermatitis, and pyoderma gangrenosum may occur after tattooing. However, there is no well-defined association between cancer and tattoos. The treatment of tattoo-related complications may include local destructive measures (cryotherapy, electro-surgery, dermabrasion, chemical destruction, ablative laser destruction), surgical excision, and thermolysis of the pigment using Q-switched laser therapy.<sup>1</sup> Over the years, numerous laser and light-based devices have been developed to remove unwanted hair effectively. These innovations have been based on applying principles of laser physics to selectively targeted hair follicles. The laser puts out very short pulses of intensely bright light. This light penetrates the skin and is absorbed by hairs that are brown

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or black. When absorbed, the light energy is converted into heat, and the hair and the cells from where the hair is growing (hair follicle) are heated. The heating causes damage to the hair follicle. Almost all of the treated hair falls out within 1-2 weeks with traditional laser hair removal. The most appropriate lasers are those with wavelengths between 700 and 1400 nm. This range offers the most significant melanin absorption and the least interference with other pigments, such as hemoglobin. The lasers most frequently used are ruby laser (694 nm), alexandrite laser (755 nm), diode laser (800 nm), and Nd:YAG laser (1064 nm).<sup>3,4</sup> Various studies have been published on the traumatic tattoos and side effects of laser hair removal separately. In this study, we present a rare form of traumatic tattoo induced by IPL hair removal.

## 2 | CASE PRESENTATION

A 37-year-old woman was referred to the laser center for laser treatment of lower extremity hair. She had no past medical and drug history. According to the patient's light skin type, the IPL laser was selected. Notably, it was the first time she had used an IPL laser. Before starting the treatment, the desired location for laser therapy was marked with a blue marker. After 1 month, the patient has referred again due to discoloration of the marked lines of laser treatment, without accompanying symptoms like burning, itching, and pain. Examination showed that the skin discoloration corresponded exactly to the area marked with blue ink for the laser therapy, but there was no evidence of inflammation on the patient's skin. Although there was strong clinical suspicion for this phenomenon's etiology, the patient refused to have a biopsy and also further treatment, so there is no pathology report. But clinically linear scar on the patient's skin shows that it is related to using blue marker, because if the burn created by IPL and related PIH (post-inflammatory hyperpigmentation), its effect will appear in the strip shape with more width.

On the other hand, since these scars had not been disappeared due to wear and over time, so it cannot be PIH. Also, in the examination with the loop, the tattoo can be seen in the depth. This would be a rare condition, which was not reported in previous studies (Figures 1 and 2).

## 3 | DISCUSSION

The tattoo is the deposition of an exogenous pigmented material into the skin. Although the most common purpose of tattooing is artistic and cosmetic, it has also been utilized in the medical field, particularly as radiation port markers. Additionally, tattoo pigment composed of lead,



**FIGURE 1** Overview of a 37-year-old patient's lower leg, 1 month after intense pulsed light. Skin discoloration appeared exactly in the area that was marked with blue marker before IPL



**FIGURE 2** Overview of a 37-year-old patient's lower leg, 1 month after intense pulsed light. Skin discoloration appeared exactly in the area that was marked with blue marker before IPL

carbon, asphalt, gunpowder, or coal can be induced explosively or traumatically. Once embedded, the exogenous pigment is taken up into lysosomes within dermal fibroblasts, macrophages, and mast cells.<sup>5</sup> Tattoos can be accidental or deliberate, permanent or temporary, professional or amateur, cosmetic, decorative, or medical. Accidental tattoos are also referred to as traumatic tattoos and result from inoculation into a wound of substances such as asphalt, amalgam, graphite, ink, or gunpowder.<sup>6</sup> According to several studies, traumatic tattoos have been reported due to skin injuries like road accidents or cosmetic procedures.<sup>2,7,8</sup> However, after hair removal by laser therapy, they have not been reported so far. In the current article, we described a rare condition in which a patient got traumatic tattoos following IPL hair removal.

Light-based technology has emerged as one of the most effective methods for many skin conditions. In recent years, lasers and IPL have been well received for hair removal. IPL is a high-energy broad-spectrum modality, which acts through selective photothermolysis to remove undesired excessive hair. Although IPL is an effective and safe method of hair removal, it may also cause complications. The most prevalent complications are pain, blistering, and dyspigmentation.<sup>9</sup> However, some rare side effects

have also been reported. Riml et al reported a case of hair removal by IPL, in which a patient suffered from a second-degree burn in regions with a previous tattoo 5 days after IPL epilation therapy. In this case, the cosmetician did not consider the similar potency of tattoo ink with melanin to absorb light energy, leading to tissue damage.<sup>10</sup> Another article introduced a rare tattoo complication induced by IPL. In this case, granulomatous reactions to previous tattoos have appeared just after IPL therapy for rejuvenation purposes.<sup>11</sup> Barcaui<sup>12</sup> described a patient who has been treated with IPL for multicolored tattoo removal. Eventually, the patient developed hypertrichosis in that area.

By the way, our study is one of the rare cases that causes tattoo after IPL therapy in the areas which marked with a blue marker.

### ACKNOWLEDGMENTS

Not applicable.

### CONFLICT OF INTEREST

None declared.

### AUTHOR CONTRIBUTIONS

AA: proposed the main conceptual idea; MB: prepared the essential data; ZT and MG: wrote the article; and ZT: submitted the final manuscript.

### CONSENT FOR PUBLICATION

"Written informed consent was obtained from the patient to publish this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal."

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in the supplementary material of this article.

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