

## Purpura following laser hair removal: a case report

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### Abstract

Laser hair removal (LHR) is a reliable and safe technique for the long-term reduction of unwanted hair. Common adverse effects involve momentary discomfort, transient erythema, and perifollicular edema, while the occurrence of purpura is infrequent. A 25-year-old Greek woman with skin type IV developed purpura on her lower extremities 48 hours after her first alexandrite laser session. A positive response to a laser hair removal provocation test was identified, aiding in diagnosis. Treatment with orally administered corticosteroids and antihistamines led to complete resolution within 7 days. Purpura following laser hair removal is a rare side effect, and its underlying cause remains unclear. Physician awareness of such adverse reactions can streamline patient care, reducing the need for unnecessary tests and offering improved management protocols.

**Key words:** laser hair removal; laser alexandrite; 755 nm laser; selective photothermolysis; purpura.

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### Introduction

Laser hair removal (LHR) is a reliable and secure technique for long-term decrease of undesired hair.<sup>1</sup> LHR procedures are individualized, requiring precise laser selection, optimal pulse duration, and suitable energy levels to ensure both effectiveness and safety. Thus, a solid understanding of laser-tissue interactions and principles of selective photothermolysis is essential for the safe execution of LHR. Adverse effects are influenced by various factors, such as skin type or parameter settings, and may include temporary discomfort, perifollicular erythema, or edema. Nevertheless, they are not strictly regarded as side effects but as an inevitable aspect of laser photothermolysis. The main adverse effects of laser hair removal arise due to epidermal injury and include blistering and involve hypopigmentation, hyperpigmentation, and scarring.<sup>2</sup> The involvement of untrained or unsupervised non-medical personnel in LHR procedures increases the risk of complications.<sup>3</sup> In this article, we present a case of purpura induced by LHR that was successfully managed at our institution.

### Case Report

A 25-year-old Greek woman with skin phototype IV was examined in our outpatient clinic with a mildly itchy skin eruption on both lower legs, occurring 48 hours after a long-pulsed 755-nm alexandrite LHR treatment. Clinical examination revealed multiple, round, non-blanching red papules, mostly located on the thighs and calves (Figure 1). The patient denied experiencing any systemic symptoms, had no history of systemic disease or recent infection, and was not taking any medications. Furthermore, she

did not report previous similar reactions after past laser treatments. Basic laboratory screening (complete blood count, prothrombin time, partial thromboplastin time, and international normalized ratio) was undertaken, along with workup for connective tissue diseases, cryoglobulinemia, and infections. Basic screening was normal, and the rest of the workup was negative. The patient did not consent to a biopsy; however, she agreed to have a provocation test on her unaffected right forearm at a lower laser setting. The test results indicated a mild positive reaction to a long-pulsed 755-nm alexandrite laser and a severe positive reaction to a long-pulsed 1064-nm Nd laser. Tests involving ice, cryogen (1,1,1,2-tetrafluoroethane), and liquid nitrogen showed negative reactions. Based on the positive responses to LHR devices, the diagnosis was LHR-induced purpura. The patient was prescribed orally administered dexamethasone (8 mg per day for 5 days and gradual tapering) and levocetirizine (5 mg per day). At the 3-day follow-up, there was significant clinical improvement (Figure 2), while at 7 days her symptoms had completely resolved (Figure 3).

### Discussion

LHR is currently the most effective method to achieve long-term hair reduction. Several types of hair removal systems have shown effectiveness, including the ruby laser (694 nm), alexandrite laser (755 nm), diode laser (800 nm), intense pulsed light source (590 to 1200 nm), and the neodymium:yttrium-aluminum-garnet laser (1064 nm).<sup>4</sup> The parameters of each laser system differ significantly, but all these lasers operate based on the principle of selective photothermolysis, targeting the melanin in hair follicles as the chromophore.<sup>5</sup> While perifollicular erythema and edema are



**Figure 1.** Appearance of lesions at baseline, with multiple round red papules identified on the thighs and calves.



**Figure 2.** Appearance of lesions after 3 days; significant clinical improvement is noticed.



**Figure 3.** Complete resolution of lesions at 7-day follow-up.

anticipated, possible adverse effects include changes in pigmentation, scarring, blistering, crusting, erosions, purpura, superficial infection, and folliculitis. Additionally, pruritus, urticaria, and livedo reticularis have been reported following laser therapy.<sup>6</sup> While most adverse effects are temporary and resolve spontaneously, improper use of LHR techniques can lead to rare yet severe complications. Purpura is more likely to develop when pulses overlap or if the skin hasn't been properly cooled. Individuals with dark, tanned, or chronically sun-exposed skin have a higher risk of adverse effects. These risks can be reduced by using the correct fluence and wavelength.<sup>7</sup>

To the best of our knowledge, there are only two similar cases documented in the literature, involving two middle-aged women with skin types II and III who experienced purpura post-alexandrite laser hair removal, with complete resolution following conservative treatment within 6 weeks and 5 days, respectively.<sup>8</sup> Skin biopsy is the most reliable method for the diagnosis of cutaneous vasculitis, whose primary manifestations may include purpura.<sup>9</sup> Nevertheless, patients often opt against it due to its invasive nature, prompting consideration of non-invasive diagnostic procedures, like a provocation test.<sup>10</sup> Patient reassurance is crucial regarding this self-limiting adverse effect, accompanied by a brief course of orally administered corticosteroids to expedite clinical recovery.

## Conclusions

LHR is regarded as a safe procedure with a minimal risk of long-term adverse effects. Purpura caused by LHR is a rare and typically self-limited complication, highlighting the importance of accurate diagnosis by healthcare professionals. A comprehensive understanding of this uncommon condition necessitates a thorough medical history and consideration of external factors. Prevention is feasible through the application of appropriate laser parameters and reducing sun exposure during the post-procedural period. Early accurate diagnosis and patient reassurance are necessary in order to obtain a successful outcome. Further clinical research is encouraged to achieve a better comprehension of this uncommon adverse event.

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