

Complications of facial telangiectasia treated with a pulsed dye laser due to professional errors in Republic of Korea: a case report

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Even trained physicians may sometimes commit professional errors. Taking sufficient precautions can only reduce the risk of complications and side effects, but cannot eliminate them completely. Here, we report the case of a patient with facial telangiectasia treated with a pulsed dye laser who subsequently developed complications because of procedural errors. A lack of knowledge of laser-tissue interaction and lack of training in the use of laser technology, coupled with improper parameter selection, can result in procedural errors. Thus, physicians should choose the correct laser parameters, such as the wavelength and pulse duration of the lasers when conducting laser procedures.

Key words: Pulsed dye laser; Safety

INTRODUCTION

Professional errors can be made by trained physicians. Professional errors are errors made by professionals and can be distinguished from adverse event in that they are preventable. Physicians should have a protocol to prevent procedure errors and know what to do when error happens. In Germany, the attempt to correct problems has been made by preparing guidelines by the German Dermatological Laser Society [1].

Pulsed dye laser (PDL) is a relatively safety treatment tool for vascular lesions. PDL is associated with mild transient side effects and rare long-term complications. The PDL emits light within the yellow spectrum (585-600 nm), which oxyhemoglobin or deoxyhemoglobin can

selectively absorb, resulting in selective photothermolysis [2]. Currently, PDL is widely used in the treatment of various vascular conditions, including port-wine stains and telangiectasias [2]. Purpura is a commonly expected adverse reaction to the use of PDL. Some conditions require purpura as an endpoint for efficacy [3]. Although most purpura tend to fade in 7-10 days, purpura followed by crusting and vesiculation can cause epidermal injury which can result in scar formation.

Especially, Asian patients with higher concentrations of epidermal melanin than Caucasian are more likely to develop adverse effects such as blistering, crusting, dyspigmentation, and scarring [4]. We report a patient with telangiectasia treated with PDL having subsequent complications due to professional errors.

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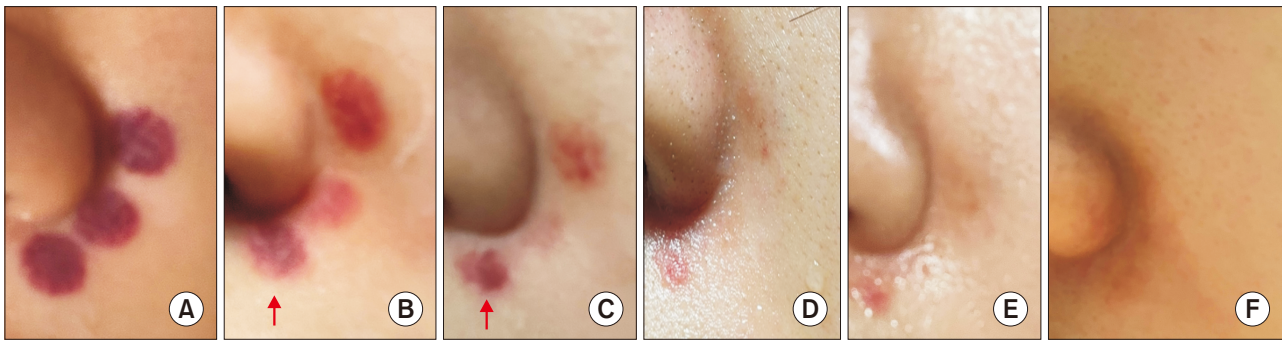


Fig. 1. (A) Immediate purpura after pulsed dye laser (Vbeam; Candela, USA). (B) Vesiculation and crust on the philtrum side, arrow (48 hours after treatment). (C) Crust formation on the philtrum side, arrow (72 hours after). (D) Granulation tissue formation (1 week after treatment). (E) Residual erythema (10 days after treatment). (F) Significant improvement of the scar at one month after treatment.

A written informed consent was obtained from the patient for the publication of this case report.

CASE REPORT

A 35-year-old female visited our clinic to treat telangiectasia around her nose. We planned to treat her telangiectasia with a PDL (Vbeam; Candela, USA) at 595 nm, 10 ms, and 8.0 J/cm² using a photo rejuvenation-diffuse redness mode. However, right before treatment, the physician did not check the device setting, and did not realize that the device was set to facial port-wine stains mode (0.45 ms, 10.0 J/cm²). She was treated with port wine stains mode for a total of six shots. Immediate purpuric response with whitening of the treated area showing signs of acute epidermal injury was observed (Fig. 1). She was treated with vigorous cooling and topical steroid. After 24 hours, vesiculation and crusting were observed at two sites. Vesicle and crust were left and a non-adherent dressing applied with ointment. After one month, the treatment site was completely resolved without sequelae (Fig. 1).

DISCUSSION

Purpura is a common and expected reaction with the use of PDL. Purpura occurs in the setting of shorter pulse widths (less than six milliseconds) and high fluence. It usually tends to fade within 7-10 days. However, Asians with more epidermal pigments (skin type III-V) a higher risk of adverse effects including blistering and permanent pigment changes. Not only purpura, but also blistering can be caused by PDL. Regarding the mechanism of purpura after PDL, it is known that when hemoglobin is thermally denatured, its iron atom is oxidized,

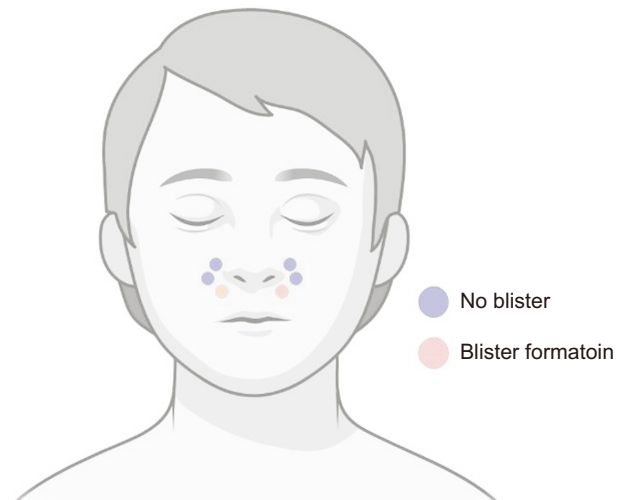


Fig. 2. Schematic figure.

forming methemoglobin, a dark pigment that can absorb, damaged walls of vessels will leak, causing petechial hemorrhages that can change the color to a dark red-purple [5]. Although oxyhemoglobin is known to absorb PDL-emitted energy, melanin can also absorb this yellow light. Thus, thermal injury by PDL can induce cleavage of dermo epidermal junction followed by blistering. A previous report has shown that PDL can potentially cause alopecia in infants [6]. This means that PDL can deliver sufficient energy to vellus hair. It can also produce side effects usually seen at hair removal such as epidermal blistering. At 595 nm, PDL can deliver energy to approximately 1.2 mm [2]. In the present case, although the same PDL parameters were used, vesiculation was different depending on the body site of a patient. Among the six laser shots, blisters occurred symmetrically only on the philtrum side (Fig. 2). This suggests that vellus hair

can act as an additional chromophore and increase thermal damage. The use of lasers to treat vascular lesions relies on the theory of selective photothermolysis [5]. Not only oxyhemoglobin, but also epidermal pigment and vellus hair can act as competing chromophores.

The majority of laser complications are due to high fluences, cooling failure, pulse stacking, high repetition rate, treatment in tanned individuals, or inadequate removal of make-up [3]. Additionally, the amount of epidermal pigment and the presence of vellus hair should be considered when selecting fluence and pulse duration. Moreover, in philtrum, hypertrophic scar usually occurs due to repetitive movements of the middle part of the face related to facial expressions and basic life activities, which can adversely affect the process of postoperative wound healing [7]. Thus, the use of PDL at the philtrum site should be done with caution. In practice, test treatments are always recommended.

In conclusion, besides understanding laser physics, confirming body site, treatment area, and laser parameter is essential to reduce the risk of complications.

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AUTHOR CONTRIBUTIONS

Conceptualization: SJP. Data curation: GRA. Formal analysis: SJP. Investigation: SJP. Methodology: KHY. Project administration: KHY. Visualization: SJP. Writing—original draft: SJP. Writing—review & editing: all authors.

CONFLICT OF INTEREST

Kwang Ho Yoo is the Editor-in-Chief of the journal but was not involved in the review process of this manuscript. Su Jung Park is an editorial board member of the journal but was not involved in the review process of this manuscript. Otherwise, there is no conflict of interest to declare.

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DATA AVAILABILITY

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SUPPLEMENTARY MATERIALS

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