Treatment of Erythema Ab Igne with Combination of Topical Hydroquinone and 1,064-nm Q-switched Neodymium-Doped Yttrium Aluminum Garnet Laser with Low Fluence

Erythema ab igne is a reticular, mottled, telangiectatic, erythematous or hyperpigmented dermatosis caused by repetitive and prolonged thermal exposure under the threshold. These skin alterations are irreversible and there has been no effective treatment. However, several cases that were treated effectively using laser-mediated photothermolysis have recently been reported. We report here on the case of a 42-year-old Asian female with erythematous to brown pigmented reticulated erythema ab igne who was treated effectively with 1,064-nm Q-switched Neodymium-Doped Yttrium Aluminum Garnet laser therapy with low-fluence of 1.8 J/cm².

Key words
Erythema ab igne; Laser therapy, Low-level; Hyperpigmentation; Hot temperature; Heating

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INTRODUCTION

Erythema ab igne (EAI), which means “redness from fire”, is a reticular, mottled, telangiectatic, erythematous or hyperpigmented dermatosis. It develops secondary to chronic moderate heat exposure. The reticular erythema can clinically resemble livedo reticularis, poikiloderma and port-wine stain and the severe chronic advanced stage can be accompanied by epidermal atrophy, scaling, and hyperpigmentation. Sometimes the EAI can accompany reactive angiomatosis, and vascular proliferation also develops to be a reactive response to the effect of heat.

In the past, it was seen in people who frequently sat in front of open fires or stoves for warmth. But in modern society, it has been reported after local application of various heat sources currently in use, such as heating pads, hot water bottles, electronic heaters or even laptop computers.

Biopsy of the lesions is not usually required, because the history of chronic heat exposure and distribution of the cutaneous lesions are important clinical clues of erythema ab igne diagnosis. However, because of the rare cases of squamous cell carcinoma and Merkel cell carcinoma arising in lesions of EAI, a biopsy should be performed if there is any evidence of cutaneous malignancy, such as nodules or ulcerations.

CASE REPORT

A 42-year-old Asian woman presented to the dermatology clinic with 2-month duration of discolored skin over the both lower legs that extended down to the shin. On physical examination, localized diffuse erythematous to brown colored reticulated, non-tender patches with atrophic scars were seen on the anterior aspect of her both distal thigh to mid shin area (Fig. 1). She had no subjective symptoms on the skin lesion include itching or pain, and no fever, chills, or other constitutional symptoms. She had a history of prolonged and repeated exposure to an electronic heater in her workplace for two months. She had no other medical or familial history. A complete blood count and comprehensive metabolic panel were normal. A rapid plasma regain test was negative. She denied biopsy to the affected skin due to worry about cosmetic problems. Erythema ab igne was diagnosed, based on her history of heat exposure, together with the clinical distribution of the reticular and hyperpigmented erythema on the heat-exposed site.

For 1 month, we tried topical hydroquinone on her lesions. After 1 month, we attempted a combination treatment of topical hydroquinone and laser therapy because the patient requested active treatment and early resolution. She was treated using 1,064-nm Q-switched (QS) neodymium-doped yttrium aluminum garnet (Nd:YAG) laser with low-fluence using Spectra VRMIII (Lutronic, Goyang, Korea) at monthly intervals. The lesions were treated with the settings of 1.8 J/cm², 8-mm spot size, and two passes with appropriate overlapping. During
the course of treatment, the patient had used topical 4% hydroquinone cream on the lesions every night.

The patient presented clinical improvements with the combination treatment of topical hydroquinone and 1,064-nm QS Nd:YAG laser with low-fluence. After 4 sessions of laser therapy, the reticulated skin lesions were almost cleared (Fig. 2). During the treatment period, there had not been any problems due to the treatment.

**DISCUSSION**

Here, we report a case of EAI effectively treated by four sessions of 1,064-nm QS Nd:YAG laser therapy with low-fluence of 1.8 J/cm². We discerned that the low fluenced 1,064-nm QS Nd:YAG laser therapy effectively cleared the mottled, pigmented skin lesions of EAI safely. Additionally, this laser therapy seemed to be more effective treatment option compared to single topical hydroquinone.

Until today, there has been no effective treatment for erythema ab igne, and removing the heat source is the mainstay of the treatment. Removal of heat exposure can only prevent the progression of disease, but if not removed, pigmentation abnormalities may persist and progress to the severe chronic advanced stage which can develop cutaneous atrophy or malignancy. Topical tretinoin or hydroquinone has been used for persistent hyperpigmentation, and epithelial atypia may respond to topical 5-fluorouracil.5,8

Although variety of treatment modalities have been tried, their effects are not satisfactory. But recently, several effective therapeutic options include laser-mediated photothermolysis were reported. Cho et al.9 has reported successful treatment of EAI with low fluorenced 1,064-nm QS Nd:YAG laser commonly used to treat pigmentary disorders such as melasma and post-inflammatory hyperpigmentation. We suppose that the low fluorenced 1,064-nm QS Nd:YAG laser targets and destroys the dermal deposition of melanin and hemosiderin with increased elastin which is the histological feature of the EAI, and this microscopic change supports the theoretical basis of laser therapy in the EAI.

In this case, topical hydroquinone for 1 month before the laser therapy was definitely not effective. But, the 4 sessions of the combination treatment of topical hydroquinone and 1,064-nm QS Nd:YAG with low-fluence therapy after the topical hydroquinone showed complete clearance of the cutaneous lesion. Because the hyperpigmentation of EAI is already formed lesions, the topical hydroquinone which has the mechanism of action by inhibiting the tyrosinase activity during melanin synthesis would not be effective than the laser therapy which destroying the formed pigmentation. Although we could not compare the effect between single laser therapy and combination therapy, our result and other report9 show that the 1,064-nm QS Nd:YAG with low-fluence therapy is the effective treatment option in EAI better than the single topical hydroquinone.

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