CASE REPORT

Low-pulse energy Q-switched Nd:YAG laser treatment for hair-dye-induced Riehl’s melanosis

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Abstract

Riehl’s melanosis, a form of dermatitis characterized by reticulate pigmentation, typically presents as a gray-brown to black hyperpigmentation on the face and neck. Among the various etiologic factors suggested, photoallergic reaction and pigmented contact dermatitis resulting from exposure to drugs, coal tar dyes, optical whitener, or other ingredients found in cosmetics are believed to be the major contributing factors in this disease. The histopathological features of Riehl’s melanosis mainly consist of pigmentary incontinence along with infiltration of numerous dermal melanophages and lymphohistiocytes.1,2 Additionally, notable clinical improvements in the treatment of this condition have been reported for intense pulsed light (IPL) therapy, in comparison to long-term topical application of bleaching agents.2 Here, we report the cases of two Asian patients treated with a low-pulse energy 1,064-nm Q-switched (QS) Nd:YAG laser for hair dye-induced Riehl’s melanosis on the face and neck. In conclusion, we observed that Riehl’s melanosis on the face and neck was effectively and safely treated with a low-pulse energy 1,064-nm QS Nd:YAG laser. We suggest that this method can be used in Asian patients with Riehl’s melanosis at risk of postinflammatory hyperpigmentation from excessive light or laser energy delivery.

Key Words: contact dermatitis, hair dye, Nd:YAG laser, post-inflammatory hyperpigmentation, Riehl’s melanosis

Riehl’s melanosis, a form of dermatitis characterized by reticulate pigmentation, typically presents as a gray-brown to black hyperpigmentation on the face and neck (1,2). Photoallergic reaction and pigmented contact dermatitis resulting from exposure to drugs, coal tar dyes, optical whitener, or other ingredients found in cosmetics are believed to be the major contributing factors in this disease (1–5). Histopathological features of Riehl’s melanosis mainly consist of pigmentary incontinence along with infiltration of numerous dermal melanophages and lymphohistiocytes (1,2). Additionally, notable clinical improvements in the treatment of this condition have been reported for intense pulsed light (IPL) therapy, in comparison to long-term topical application of bleaching agents (2). Here, we report the cases of two Asian patients treated with a low-pulse energy 1,064-nm Q-switched (QS) neodymium-doped yttrium aluminum garnet (Nd:YAG) laser for hair dye-induced Riehl’s melanosis on the face and neck.

Case 1

A 62-year-old female patient presented with a three-month history of reticulate hyperpigmented patches with indistinct borders on the face and neck. There were no subjective symptoms, and she had no relevant medical or familial history. Prior to the appearance of the hyperpigmented patches, the patient had dyed her hair using a black henna hair dye product, after which she reportedly experienced a transient mild itching sensation on the face and neck (Figure 1a and 1c). A biopsy specimen was obtained from the hyperpigmented lesions on the face, and revealed pigmentary incontinence along with infiltration of numerous dermal melanophages and lymphohistiocytes (Figure 3a and 3b). On this basis, we made a diagnosis of hair-dye-induced Riehl’s melanosis.
After obtaining informed consent, the patient was treated with 13 sessions of 1,064-nm dual-pulsed Q-switched Nd:YAG laser (SPECTRA™, Lutronic, Goyang, Korea) treatment at three-week intervals. Before each laser treatment, lesions were anesthetized with topical EMLA cream (eutectic mixture of 2.5% lidocaine HCl and 2.5% prilocaine; AstraZeneca AB, Södertälje, Sweden) under occlusion for an hour. Lesions were then treated utilizing the settings of 1.8 J/cm², 8-mm spot size, until the appearance of mild erythema or fine petechiae with appropriate overlapping (6). During the course of treatment, the patient did not use any bleaching agents. She was also instructed to use topical sunscreens and avoid excessive sun exposure. The patient did not use henna hair dye products any longer and demonstrated marked clinical improvement after four sessions of QS Nd:YAG treatment without any remarkable side effects. One month after the final treatment, another biopsy specimen was taken from the facial skin just next to the previously biopsied site and showed much fewer melanophages and lymphohistiocyes in the dermis compared with the initial histopathologic findings (Figure 3c and 3d). We observed that the therapeutic effects of the laser treatment lasted for more than 3 months after the final treatment (Figure 1b and 1d).

Case 2

A 47-year-old female patient presented with reticulate brownish to almost black hyperpigmentation lesions, which had rapidly progressed on the face and neck over the previous 5 months. She had no pertinent medical or familial history. The patient had undergone three sessions of hair dyeing at one-month intervals using a black hair dye product without remarkable adverse events; however, the asymptomatic reticulate brownish to almost black pigmentary changes began to rapidly develop on the face, most prominently on her forehead, temples, and neck (Figure 2a and 2c). A clinical diagnosis of hair dye-induced Riehl’s melanosis was made.

The patient was instructed to avoid using hair dye products. After obtaining informed consent, the patient was treated with eight sessions of 1,064-nm QS Nd:YAG laser (Lutronic) treatment at three-week intervals. After applying topical anesthesia, lesions were treated with the settings of 1.8 J/cm², 8-mm spot size, until the appearance of mild erythema or fine petechiae with appropriate overlapping. During the course of treatment, the patient did not use any bleaching agents. She was also instructed...
to apply topical sunscreens and avoid excessive sun exposure. The patient demonstrated marked clinical improvement after two sessions of QS Nd:YAG treatment, the results of which were maintained for more than 3 months following the last treatment (Figure 2b and 2d).

Discussion

The treatment and disease course of Riehl’s melanosis remains inconclusive. Avoidance from the suspected causal agents is essential in preventing disease progression (1,2). Topical bleaching agents containing hydroquinone, tretinoin, or glycolic acid have also been used to treat this disease with unsatisfactory clinical outcomes (1,7). Previous study demonstrated that six Asian patients with Riehl’s melanosis presented good-to-excellent therapeutic responses with 8–10 sessions of IPL treatment (2). Additionally, the therapeutic efficacy of IPL was shown to correlate with the number of treatment sessions, and both epidermal and dermal melanin pigments were effectively removed by the IPL treatment (2).

In the present report, we described the cases of two Asian patients with hair-dye-induced Riehl’s melanosis on the face and neck treated with a low-pulse energy 1,064-nm QS Nd:YAG laser. The 1,064-nm QS Nd:YAG laser, which is widely used in many dermatology clinics, induces non-ablative and selective photothermolysis of target pigments. There was a randomized, split-face trial comparing the use of QS Nd:YAG laser versus hydroquinone for the treatment of melasma (8). Participants exposed half of their face to 1,064-nm QS Nd:YAG laser treatment for five sessions at 1-week intervals while 2% hydroquinone was applied to the other side of their face. They found that the laser-treated side of the face achieved much more improvement in relative lightness index than the hydroquinone-treated side (8).

Moreover, the relatively low-pulse energy treatment of this laser has demonstrated good therapeutic efficacies against melasma and refractory postinflammatory hyperpigmentation (6,9), and is usually well tolerated with no remarkable adverse events, owing to the limited thermal diffusion effects on pigments and surrounding tissues (10). The light source of IPL emits broad spectrum of light energy at a wavelength between 500 and 1200 nm (11). Since excessive energy delivery of light or laser sources on Riehl’s melanosis would overstimulate postinflammatory hyperpigmentation or the underlying pigmentary
skin conditions in Asian patients (2), the selective use of low-pulse energy of QS Nd:YAG laser in the treatment of Riehl’s melanosis seemed to reduce the risk of side effects in our cases (10).

In this report, an initial biopsy specimen revealed vacuolar degeneration of the basal cell layer with pigmentary incontinence of the epidermis and infiltration of numerous melanophages and lymphohistiocytes in the dermis. Additionally, we surmised that the presence of a few dermal eosinophils in our patient’s biopsy specimen might support the pathogenic association between allergic contact dermatitis and this pigmentary disorder. A second biopsy specimen, which was obtained from the facial skin after 13 sessions of QS Nd:YAG laser treatment, revealed histologic improvement in both the epidermis and dermis as presented in a previous report (2).

In conclusion, we observed that Riehl’s melanosis on the face and neck was effectively and safely treated with a low-pulse energy 1,064-nm QS Nd:YAG laser. We suggest that this method can be used in Asian patients with Riehl’s melanosis at risk of postinflammatory hyperpigmentation from excessive light or laser energy delivery.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

References