CASE REPORTS

Treatment of early-stage erythematotelangiectatic rosacea with a Q-switched 595-nm Nd:YAG laser

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Abstract

Erythematotelangiectatic rosacea presents as persistent erythema and telangiectasia with frequent flushing and blushing on the facial and extrafacial skin (1). Patients with late-stage rosacea show acneiform papules, pustules, and nodules with persistent plaque-form edema. Despite garnering only grade-C or -D level recommendations, a 585-nm or 595-nm flashlamp-pumped pulsed-dye laser can be considered as an effective therapeutic modality for the treatment of rosacea in patients who are refractory to topical and/or systemic treatments. In this report, treatment with a Q-switched 595-nm neodymium-doped yttrium aluminum garnet (Nd:YAG) laser with low non-purpuragenic fluence proved to be safe and effective in treating early-stage erythematotelangiectatic rosacea in two female Korean patients. Laser treatment for rosacea was delivered with the settings of pulse energy of 0.4–0.5 J/cm², pulse duration of 5–10 ns, 5-mm spot size, 5 Hz, and 500 shots. Additionally, we found that remarkable therapeutic effects were achieved for both rosacea and melasma by combining Q-switched quick pulse-to-pulse 1,064-nm Nd:YAG and Q-switched 595-nm Nd:YAG laser treatments, which required only the changing of handpieces equipped with solid dye. In conclusion, we suggest that treatment with a Q-switched 595-nm Nd:YAG laser with low fluence may provide an additional therapeutic option for treating early-stage erythematotelangiectatic rosacea.

Key Words: erythematotelangiectatic, Nd:YAG laser, Q-switched, 595-nm, rosacea

Introduction

Rosacea clinically presents as persistent erythema and telangiectasia with frequent flushing and blushing on the facial and extrafacial skin (1). Patients with late-stage rosacea show acneiform papules, pustules, and nodules with persistent plaque-form edema (1,2). Although rosacea is a common skin disease, the precise etiopathogenesis of this skin disease remains unknown. However, ultraviolet radiation, climatic conditions, emotional or hormonal changes, topical cosmetics or irritants, medications, microbial organisms, and diet have been suggested as inducing or triggering factors of rosacea in genetically predisposed patients (2–4). Additionally, Plewig and Kligman suggested that rosacea can coexist with or develop in young patients with acne with frequent flushing and blushing (1).

Various treatment modalities, including topical agents, oral medicines, and laser and light therapies, have been used for the treatment of rosacea (2,4). Previously, Bernstein and Kligman demonstrated remarkable improvement therein after four sessions of 595-nm long-pulsed dye laser treatment with the laser settings of pulse duration of 3 milliseconds, fluences of 0.4–0.5 J/cm², pulse duration of 5–10 ns, 5-mm spot size, 5 Hz, and 500 shots. Additionally, we found that remarkable therapeutic effects were achieved for both rosacea and melasma by combining Q-switched quick pulse-to-pulse 1,064-nm Nd:YAG and Q-switched 595-nm Nd:YAG laser treatments, which required only the changing of handpieces equipped with solid dye. In conclusion, we suggest that treatment with a Q-switched 595-nm Nd:YAG laser with low fluence may provide an additional therapeutic option for treating early-stage erythematotelangiectatic rosacea.
erythematotelangiectatic rosacea who were effectively treated with a Q-switched 595-nm neodymium-doped yttrium aluminum garnet (Nd:YAG) laser.

Case reports

Two Korean female patients (23-year-old and 52-year-old) with Fitzpatrick skin type IV participated in this study. This study was approved by the ethics boards of Clinique L Dermatology (Goyang, Korea) and Lutronic Corporation (Goyang, Korea). Both patients were clinically diagnosed with erythematotelangiectatic rosacea, and both of them also presented with mild melasma lesions on periorbital and malar areas. The previous medical history of the first patient included treatment of acne vulgaris in her adolescence, while the second patient reported excessive sun exposure in her 20’s and 30’s. Previously, they had neither been treated with any laser or light devices nor been prescribed topical agents and oral retinoids for the treatment of rosacea or melasma. Otherwise, they had no relevant medical or familial history.

After obtaining written informed consent, the patients were treated with six sessions of Q-switched 1,064-nm Nd:YAG laser (SPECTRA XT™, Lutronic Corporation; Goyang, Korea) treatment for melasma and Q-switched 595-nm Nd:YAG laser (SPECTRA XT™) treatment for erythematotelangiectatic rosacea at two-week intervals. On the entire face, 1,064-nm Q-switched Nd:YAG laser treatment was delivered using the quick pulse-to-pulse (Q-PTP) mode with the settings of pulse energy of 1.6–2.0 J/cm², which was irradiated at dual pulses of 0.8–1.0 J/cm² and 80-µsec intervals, pulse duration of 5–10-nsec, 7-mm spot size, 10 Hz, and 2,000 shots with appropriate overlapping. Additional treatment for erythematotelangiectatic rosacea was delivered with the settings of pulse energy of 0.4–0.5 J/cm², pulse duration of 5–10 ns, 5-mm spot size, 5 Hz, and 500 shots with appropriate overlapping. During the course of treatment, they used neither bleaching agents nor oral contraceptives. The patients were recommended to avoid excessive sun exposure and instructed to apply a broad-spectrum sunscreen during and after the treatment.

At one month after the final treatment, three separate blinded dermatologists objectively assessed clinical improvement scores for the erythematotelangiectatic rosacea lesions using a Global Aesthetic Improvement Scale (GAIS) of “worse than before” (score: -1), “clinically unchanged” (score: 0), “slightly improved” (score: 1), “moderately improved” (score: 2), and “markedly improved” (score: 3) by analyzing photographs. The photographs were taken before and after each treatment under normal, ultraviolet, and cross-polarized light exposures with an imaging tool (Janus®, PSI corporation, Ltd., Seoul, Korea). Additionally, the patients were asked to report experiences of pain during the treatment, as well as any side effects.

Initially, the patients presented with erythematous patches with telangiectasias on the cheeks, as well as peri orbital and malar distribution of melasma lesions under normal light exposure (Figures 1A and 3A). Additional photographs taken under ultraviolet light exposure revealed the distribution of hyperpigmented lesions on the face (Figures 1C and 3C); meanwhile, cross-polarized light exposure demonstrated erythematotelangiectatic rosacea on the cheeks in both patients (Figures 2A, B and 4A, B).

The first patient presented with noticeable overall clinical improvement from the third session of treatment with the Q-switched 1,064-nm Q-PTP Nd:YAG and Q-switched 595-nm Nd:YAG lasers, and pronounced improvement was recorded at one month after the final treatment session (Figure 1B and D). Objective clinical assessment of the erythematotelangiectatic lesions revealed a mean GAIS score of 3 (Figure 2C and D). The second patient presented with noticeable overall clinical improvement from the fifth session of treatment with the Q-switched Q-PTP 1,064-nm Nd:YAG and Q-switched 595-nm Nd:YAG lasers, and remarkable improvement was recorded at one month after the final treatment (Figure 3B and D). Upon objective clinical assessment of the erythematotelangiectatic lesions, a mean GAIS score of 2.7 was recorded (Figure 4C and D).

Both the patients were satisfied with the clinical outcomes, and no remarkable side effects, including post-therapy hyper- or hypopigmentation, post-thera-

![Figure 1](image-url) Photographs taken under normal light exposure reveal erythematotelangiectatic rosacea and melasma in a 23-year-old woman (A) before and (B) at one month after six sessions of Q-switched Q-PTP 1,064-nm Nd:YAG laser treatment for melasma and Q-switched 595-nm Nd:YAG laser treatment for erythematotelangiectatic rosacea at two-week intervals. Photographs taken under ultraviolet light exposure (A) before and (B) at one month after the treatments.
apy prolonged erythema, and scarring, were reported. In addition, pain during both the Q-switched Q-PTP 1,064-nm Nd:YAG laser and Q-switched 595-nm Nd:YAG laser treatments was well tolerated in both patients even without the use of a specific local anesthesia.

**Discussion**

Selective photothermolysis with the wavelengths of 585 nm or 595 nm and long pulse duration is considered most effective for treating congenital and acquired vascular lesions (6). Particularly, pulsed-dye lasers with the pulse duration of 0.35–40 milliseconds are considered as the lasers of choice for the treatment of most vascular lesions (6,7). In addition, pulsed-dye lasers can be effectively and safely utilized for the treatment of inflammatory skin diseases, especially localized psoriasis and acne vulgaris, with a grade-B recommendation (6). Furthermore, despite grade-C or -D level recommendations, use of a pulsed-dye laser is also an effective therapeutic modality for treating rosacea in patients refractory to topical and/or systemic treatments (2,6).

In the present study, we treated two female patients with early-stage erythematotelangiectatic rosacea with a Q-switched 595-nm Nd:YAG laser. The 595-nm wavelength was generated as a Q-switched 532-nm Nd:YAG laser passed through solid dye in a handpiece and subsequently converted to a wavelength of 595 nm. As changes in microvascular lesions are difficult to objectively evaluate on photographs taken under normal light exposure, cross-polarized photographs were used in this study for the assessment of changes in erythematotelangiectatic lesions (2). By targeting microvascular structures in early-stage erythematotelangiectatic rosacea lesions, the Q-switched 595-nm Nd:YAG laser seemed to effectively treat the skin lesions with low energy fluences of 0.4–0.5 J/cm². Moreover, the use of non-purpuragenic low pulse energy allowed our participants to tolerate the laser treatments without the need for any local anesthesia, and post-therapy erythema spontaneously disappeared within one hour.

Photographs under ultraviolet light exposure were also analyzed for the evaluation of adverse effects of Q-switched 595-nm Nd:YAG laser treatment, as well as the therapeutic effects of Q-switched...
Q-PTP 1,064-nm Nd:YAG laser treatment on the pigmented skin lesions in our study. The treatment mode of Q-switched Q-PTP used in this study irradiated 1,064-nm Nd:YAG laser energy as a split fluence at dual-pulse intervals of 80 μsec. Therefore, when we chose to treat the entire face with 1.6–2.0 J/cm² in the Q-PTP mode, the patients actually received dual pulses of 0.8–1.0 J/cm² at pulse intervals of 80 μsec. In a previous study comparing Q-switched single-pulse Nd:YAG and Q-switched dual-pulse Nd:YAG laser treatments for post-inflammatory hyperpigmentation, Q-switched dual-pulse treatment demonstrated better clinical outcomes with reduced risk of adverse events than Q-switched single-pulse treatment (8). Herein, we found that remarkable therapeutic effects were achieved for both rosacea and melasma by combining the Q-switched Q-PTP 1,064-nm Nd:YAG and Q-switched 595-nm Nd:YAG laser treatments, which required only the changing of handpieces equipped with solid dye.

In this report, Q-switched 595-nm Nd:YAG laser treatment with low non-purpuragenic fluence proved to be safe and effective in treating early-stage erythematotelangiectatic rosacea in two female Korean patients. In addition, combination of low-fluence Q-switched Q-PTP 1,064-nm Nd:YAG treatment with Q-switched 595-nm Nd:YAG laser treatment allowed for marked clinical improvement in melasma lesions. Accordingly, we suggest that treatment with a Q-switched 595-nm Nd:YAG laser with low fluence may provide an additional therapeutic option for treating early-stage erythematotelangiectatic rosacea, even in Asian patients with hyperpigmented skin lesions.

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

References