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CASE REPORT

Combination of 660-nm Ruby Laser-like Technology and Low-Fluence 1064-nm Laser Toning for Melasma and Solar Lentigines: A 20-Session Longitudinal Case Study

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ABSTRACT: Melasma and solar lentigines are common acquired facial pigmentary disorders that frequently coexist in clinical practice. The management of mixed pigmentary conditions remains challenging, and evidence for combination laser therapy in such cases is limited, particularly in extended treatment protocols. We report the case of a 52-year-old woman with Fitzpatrick skin type III who presented with coexisting melasma and solar lentigines of five years' duration. She underwent 20 sessions of exclusive laser therapy over 2.5 years using low-fluence 1064-nm Q-switched Nd:YAG (QSNY) laser and 660-nm ruby laser–like technology. Progressive and sustained clinical improvement was observed throughout the treatment course, with visible changes noted after 10 sessions. The modified Melasma Area and Severity Index (mMASI) score demonstrated a 75% reduction, decreasing from 21.30 at baseline to 5.30 after 20 sessions. The treatments were well tolerated, with only transient post-treatment erythema resolving within 1–2 days. This case suggests that extended combination laser therapy using low-fluence 1064-nm QSNY and 660-nm ruby laser-like technology may be an effective and well-tolerated option for patients with coexisting melasma and solar lentigines when carefully planned and closely monitored.

Keywords: Melasma, Solar lentigines, Low-fluence Q-switched laser therapy, Mixed pigmentary disorders, Q-switched Nd:YAG

INTRODUCTION

Melasma and solar lentigines are common acquired facial pigmentary disorders [1]. Melasma is one of the most frequently encountered pigmentary conditions in clinical practice and typically presents as symmetrical brown macules or patches on the face. Its development is influenced by ultraviolet (UV) exposure, hormonal factors, and genetic predisposition [2]. Solar lentigines, also known as sunspots, are well-defined brown macules that commonly occur on sun-exposed areas as a result of chronic UV damage and represent an early sign of photoaging [3].

In clinical practice, patients often present with mixed pigmentary disorders rather than a single condition. The coexistence of melasma and solar lentigines poses a therapeutic challenge, as these conditions differ in pathophysiology, pigment depth, and treatment response. Careful selection and balancing of treatment parameters are therefore required to avoid undertreatment of one condition or complications such as post-inflammatory hyperpigmentation (PIH).

Treatment modalities, including topical depigmenting agents, chemical peels, and laser-based therapies, are well established in the management of both melasma and solar lentigines [2,3]. Among laser modalities, low-fluence 1064-nm Q-switched Nd:YAG (QSNY) laser is widely recommended for the treatment of melasma in Asian populations [4]. It acts via selective photothermolysis, targeting melanosomes while minimizing damage to surrounding tissue, thereby enabling safe pigment reduction [5,6]. In contrast, shorter wavelengths have demonstrated greater efficacy in epidermal pigmented lesions such as solar lentigines. The 532-nm and 660-nm QSNY lasers have both shown therapeutic efficacy, with greater melanin reduction observed using the 660-nm wavelength [7]. The 694-nm Q-switched ruby laser has also demonstrated high efficacy, achieving >75% improvement after a single session and complete lesion clearance after two sessions in patients with solar lentigines [8]. In addition, 660-nm ruby laser–like technology has been explored for pigmentary disorders such as lentigines, with promising clinical outcomes [9].

However, most published studies have focused on single pigmentary conditions or relatively short treatment protocols. Evidence regarding extended, repeated low-fluence 1064-nm QSNY laser therapy combined with ruby laser–like technology for concurrent melasma and solar lentigines remains limited. This case report therefore aims to describe the outcomes of an extended combination laser regimen using low-fluence 1064-nm QSNY and 660-nm ruby laser–like technology over 20 treatment sessions in a patient with coexisting melasma and solar lentigines.

CASE PRESENTATION

A 52-year-old woman with Fitzpatrick skin type III presented in May 2023 with facial pigmentation involving diffuse melasma and solar lentigines over her bilateral cheeks, which had been present for five years. She reported no medical issues, no family history of pigmentation disorders, and had never undergone any aesthetic treatments. She previously worked as a scuba diving instructor in Hong Kong for over 10 years, during which she performed multiple daily dives without sun protection. She retired one year prior to consultation and sought treatment after noticing a gradual worsening of her pigmentation.

Clinical examination revealed symmetrical brown patches over the forehead, bilateral cheeks, and chin, consistent with melasma, and discrete darker brown spots over the bilateral cheeks, suggestive of solar lentigines. The diagnosis was made clinically. Melasma severity was assessed using the modified Melasma Area and Severity Index (mMASI), a validated scoring system evaluating the area and darkness of pigmentation across four facial regions (forehead, right malar, left malar, and chin), with total scores ranging from 0 to 24. Her baseline mMASI score was 21.30. Written informed consent was obtained from the patient for publication of the clinical images and case details.

MANAGEMENT AND OUTCOME

The patient underwent exclusive laser therapy using the Spectra XT platform (Lutronic, South Korea), delivering 1064-nm QSNY and 660-nm ruby laser–like treatment (RuVY Touch laser). Both melasma and solar lentigines were treated within the same session. The 1064-nm QSNY served as the primary modality for melasma, while the 660-nm ruby laser–like therapy was applied selectively to target solar lentigines. Fluence ranged from 0.65–1.0 J/cm^2 for the 1064-nm QSNY and 0.75–1.0 J/cm^2 for the 660-nm ruby laser–like therapy. Fluence was adjusted at each visit according to clinical response and patient tolerance, while spot size and pulse duration remained constant throughout the treatment course. Laser parameters are summarized in **Table 1**.

Treatment sessions were initially performed at 4-week intervals and gradually extended to 8-week intervals as clinical improvement stabilized. The patient completed a total of 20 sessions over 2.5 years, with good adherence to the treatment schedule. No topical depigmenting agents or adjunctive therapies were used during this period. She was advised to maintain strict photoprotection, including daily use of broad-spectrum SPF 50 PA+++ sunscreen, adequate moisturization, and avoidance of potentially irritating skincare products.

Progressive and consistent clinical improvement was observed throughout the treatment course, with visible changes after 10 sessions (**Figures 1B–3B**) and further improvement after 20 sessions (**Figures 1C–3C**) in both pigmentary conditions. The modified Melasma Area and Severity Index (mMASI) score decreased from 21.30 at baseline to 9.40 after 10 sessions and 5.30 after 20 sessions, representing a 75% reduction from baseline. The treatment was well tolerated, with only transient post-treatment erythema resolving within 1–2 days. The patient reported satisfaction with the outcome. No recurrence has been observed to date during ongoing maintenance therapy.

Table 1. Laser treatment parameters during the treatment course.

Laser	Spot size (mm)	Fluence (J/cm^2)	Frequency	Pulse type	Number of passes
1064-nm QS Nd:YAG	8	0.65–1.0	10 Hz	Q-switched	2–3 passes over melasma-affected areas
660-nm RuVY Touch	3	0.75–1.0	Single shot	Q-switched	Focal passes over solar lentigines

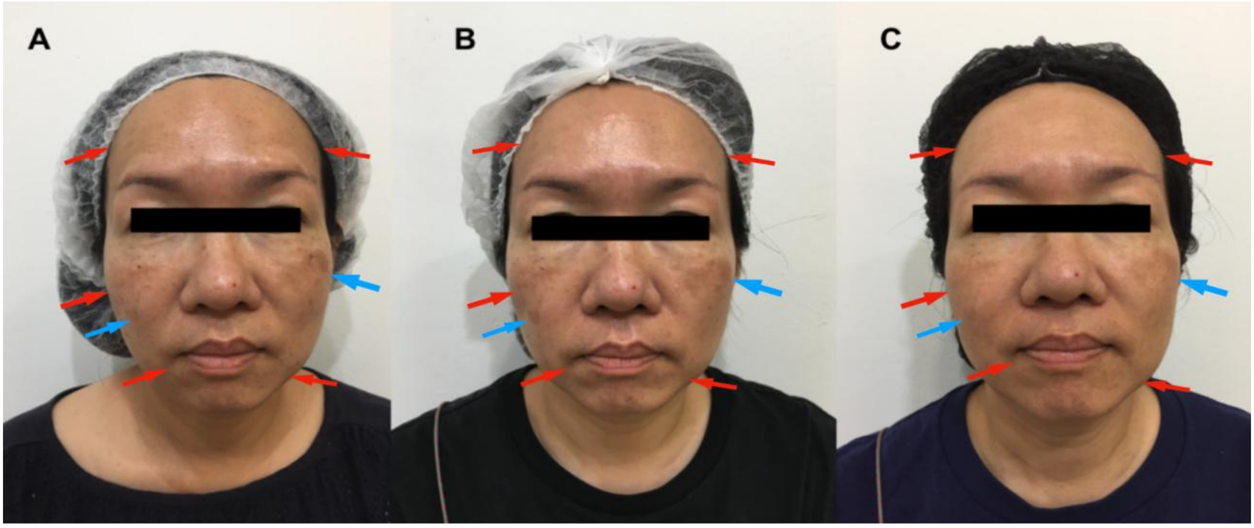

Figure 1. Frontal view of facial pigmentation at baseline **(A)**, after 10 sessions **(B)**, and after 20 sessions **(C)**. Red arrows indicate melasma, and blue arrows indicate solar lentigines.

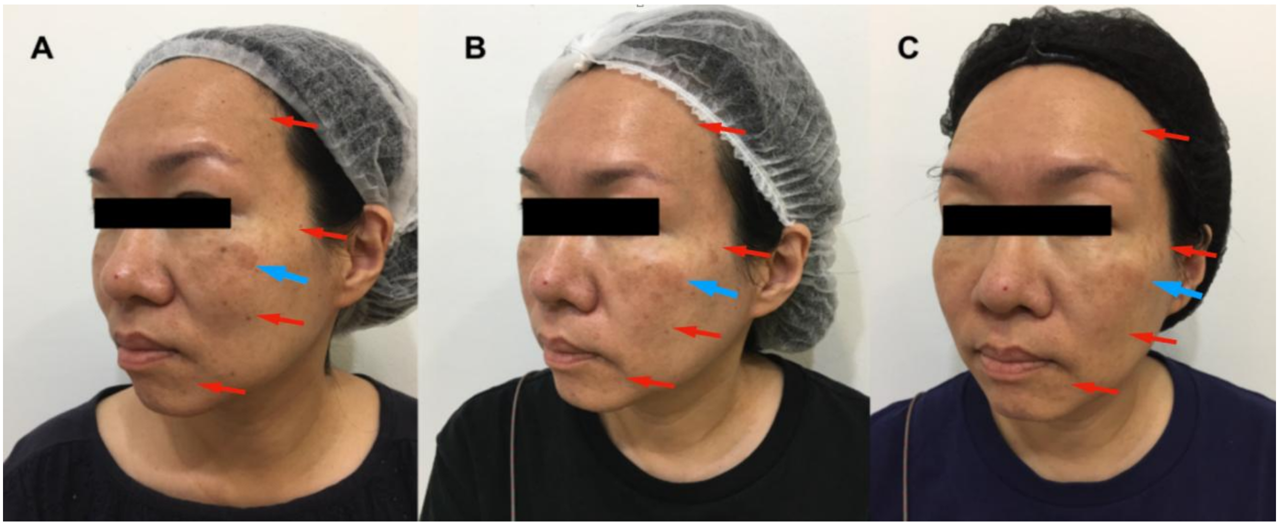

Figure 2. Left oblique (45°) view of facial pigmentation at baseline **(A)**, after 10 sessions **(B)**, and after 20 sessions **(C)**. Red arrows indicate melasma, and blue arrows indicate solar lentigines.

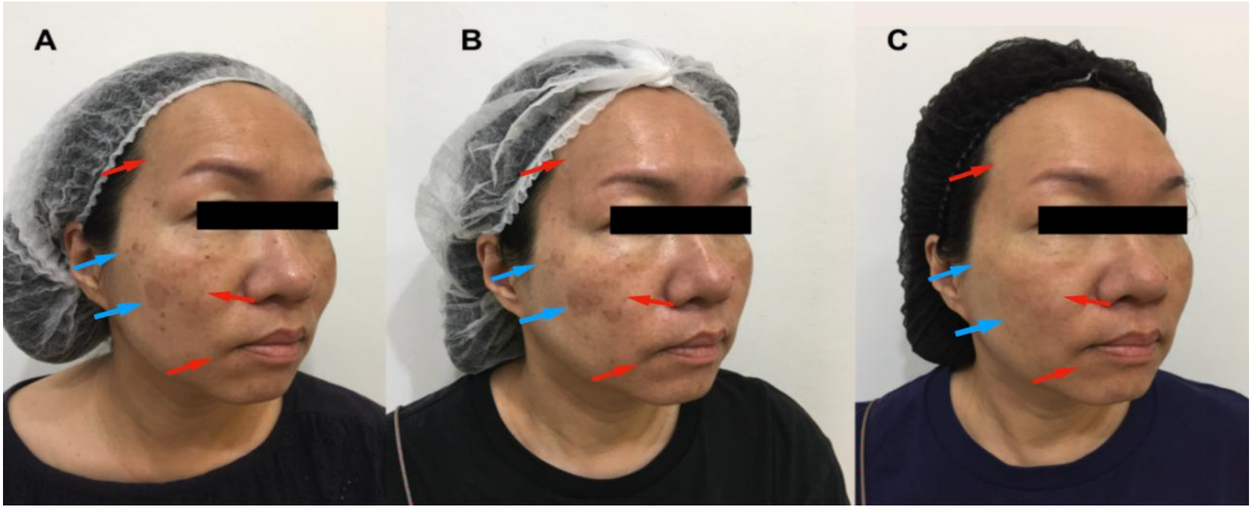

Figure 3. Right oblique (45°) view of facial pigmentation at baseline **(A)**, after 10 sessions **(B)**, and after 20 sessions **(C)**. Red arrows indicate melasma, and blue arrows indicate solar lentigines.

DISCUSSION

Melasma and solar lentigines frequently coexist in clinical practice due to cumulative ultraviolet exposure and shared risk factors. However, differences in their pathophysiology and depth of pigment deposition may result in variable treatment responses, making simultaneous management of both conditions challenging.

Low-fluence 1064-nm QSNY laser therapy is widely used for the treatment of melasma due to its ability to selectively target melanin with a favorable safety profile [4]. In contrast, shorter wavelengths such as the 694-nm Q-switched ruby laser have been shown to be effective in treating epidermal pigmented lesions, including solar lentigines [8, 10,11]. In the present case, combined treatment with low-fluence 1064-nm QSNY laser and 660-nm ruby laser–like therapy resulted in progressive clinical improvement of both melasma and solar lentigines, with minimal adverse effects.

Evidence for combined or extended laser protocols in mixed pigmentary disorders remains limited, as most studies have focused on single conditions or short treatment courses. In addition, data on 660-nm ruby laser–like technology for solar lentigines are still scarce. This case therefore suggests a potential role for long-term sequential laser therapy targeting both dermal and epidermal pigment components to achieve gradual and sustained improvement.

Extended treatment sessions may enhance outcomes by facilitating progressive clearance of both superficial and deeper pigment while minimizing the risk of adverse effects, such as PIH. This approach may be particularly relevant in higher-risk populations such as Asian skin types. In this case, treatment intervals guided by clinical response and good patient adherence likely contributed to the sustained improvement observed.

CONCLUSION

This case report demonstrates that combination therapy with low-fluence 1064-nm QSNY and 660-nm ruby laser-like technology over 20 sessions may achieve sustained clinical improvement in patients with coexisting melasma and solar lentigines. Different pigmentary components may respond at varying rates, requiring repeated treatment sessions to achieve gradual and sustained clearance while minimizing adverse effects. Careful patient selection, individualized treatment parameters, and close clinical monitoring are essential to optimize therapeutic outcomes.

Further studies with larger sample sizes are required to establish standardized protocols for the long-term management of concurrent melasma and solar lentigines. Future research may incorporate objective skin imaging systems, such as VISIA, Antera 3D, or ISEMECO analysis, to enable more quantitative and reproducible assessment of pigmentary changes.

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CONFLICT OF INTEREST

The author declares no potential conflicts of interest.

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