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CASE REPORT

Sequential Q-Switched Nd:YAG Laser and Polynucleotide Therapy for Chronic Lower Limb Hyperpigmentation: A Two-Year Case Report

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ABSTRACT: Chronic solar lentigines of the lower limbs are challenging to manage due to delayed healing and variable responses to conventional therapies, and evidence guiding optimal treatment strategies for this anatomical region remains limited. We report a case of a 69-year-old Malaysian Chinese woman with a 20-year history of progressive solar lentigines affecting both lower limbs, predominantly over the knees and calves, with minimal response to conservative skincare measures. A sequential treatment protocol was employed, consisting of six sessions of Q-switched Nd:YAG laser (QSNYL) at two-month intervals (Phase 1), followed by alternating monthly sessions of QSNYL and polynucleotide (PN) therapy (Phase 2). Progressive lightening of pigmentation was observed during Phase 1, with further improvement after the introduction of combination therapy in Phase 2. The treatment was well tolerated, with no significant adverse events. Patient-reported outcomes, assessed using the Global Aesthetic Improvement Scale (GAIS), scored 1 (very much improved). At the two-year follow-up, sustained clinical improvement was observed. This sequential combination therapy may represent a safe, effective, and well-tolerated strategy for managing chronic lower limb solar lentigines.

Keywords: Q-Switched Nd:YAG Laser, Polynucleotide, Chronic lower limb hyperpigmentation

INTRODUCTION

Chronic hyperpigmentation of the lower limbs, including solar lentigines, is commonly encountered in clinical practice. However, clinical evidence on treatment remains limited compared with facial pigmentary disorders. Most published studies on the management of solar lentigines have primarily focused on the face and upper extremities [1]. Consequently, current treatment strategies for pigmentary disorders of the lower extremities are largely extrapolated from evidence derived from facial or generalized cutaneous involvement.

Q-switched Nd:YAG laser (QSNYL) therapy is an established modality for the treatment of benign pigmented lesions, including solar lentigines. QSNYL operates on the principle of selective photothermolysis, whereby melanin is targeted while minimizing thermal injury to surrounding tissues. It has been widely used in the treatment of solar lentigines with favourable clinical outcomes [2-5]. However, adverse effects such as post-inflammatory hyperpigmentation have also been reported, particularly in Asian skin types [6].

Polynucleotides (PN) are highly purified natural DNA molecules extracted from trout gonads [7]. Emerging evidence suggests that PN may provide a safe and effective option for skin rejuvenation, including improvement in skin texture, elasticity, and reduction of fine wrinkles [8]. Accordingly, PN may serve as a potential adjunct in

combination-based aesthetic treatments to enhance overall clinical outcomes.

Treatment of photoaged skin on the lower limbs is inherently more challenging due to slower healing capacity and reduced density of follicular sebaceous units [9]. Therefore, conservative therapeutic approaches, including lower fluence settings, longer treatment intervals, and staged protocols, may be more appropriate for this anatomical region. Furthermore, management of lower limb skin concerns often requires a multimodal approach, as pigmentary changes may coexist with alterations in skin texture, elasticity, and overall dermal quality. A review of leg rejuvenation techniques has emphasized that combination strategies are typically necessary to address the multifactorial nature of lower limb ageing [9]. Such approaches aim to target multiple contributing factors simultaneously and may lead to better aesthetic outcomes compared with monotherapy. This case report presents the clinical outcome of a combination treatment involving QSNYL and PN in a patient with solar lentigines of the lower limbs.

CASE PRESENTATION

A 69-year-old Malaysian Chinese woman presented with a 20-year history of progressive hyperpigmentation affecting both lower limbs, which had gradually worsened and resulted in cosmetic concern, negatively impacting her self-confidence. The pigmentation was predominantly distributed over the knees and calves, where discrete to coalescent areas of hyperpigmentation were observed. Similar lesions were also present on the face, chest, and bilateral upper limbs. However, these areas were not treated as part of the present protocol, as the patient's primary concern was the lower limbs.

Conservative management with regular use of body moisturisers and sun protection resulted in minimal improvement. The patient denied associated pain, pruritus, ulceration, or episodes of inflammation. Relevant contributing factors included a history of regular swimming from a young age, suggestive of chronic ultraviolet exposure, as well as xerosis. Her past medical history was significant for traumatic brain injury five years prior, for which she was receiving prophylactic levetiracetam once daily. There was no history of photosensitising medication use, chronic venous insufficiency, or recent lower limb trauma.

On physical examination, multiple symmetrical, well-demarcated brown to dark brown macules consistent with solar lentigines were observed over the bilateral lower limbs, with no evidence of active inflammation, scaling, ulceration, or infection. Peripheral circulation was clinically adequate. A clinical diagnosis of bilateral lower limb solar lentigines was made.

MANAGEMENT

After obtaining written informed consent, a sequential two-phase treatment protocol was initiated. In Phase 1, the patient underwent treatment with a QSNYL system (Lutronic Spectra XT, South Korea), utilizing both 1064 nm and 660 nm ruby laser-like treatment mode. Sessions were performed at approximately 2-month intervals for a total of six sessions, aiming to gradually reduce pigment burden while allowing adequate recovery between treatments. The 1064 nm QSNYL was delivered at a fluence of 1 J/cm^2, spot size of 8 mm, frequency of 10 Hz, and three passes. This was combined with the 660 nm ruby-like handpiece at a fluence of 1 J/cm^2, spot size of 3 mm, frequency of 1 Hz, and a single pass, with frosting used as the clinical endpoint.

Following completion of Phase 1, Phase 2 consisted of alternating monthly sessions of QSNYL and polynucleotide (PN) therapy (Plinest®, Mastelli, Italy), with each modality administered at approximately 4-week intervals. A total of four PN sessions were performed. PN was administered at a total volume of 2 mL via intradermal microinjections using a 31G needle, targeting the pigmented areas of the lower limbs. QSNYL sessions during Phase 2 were performed using the same parameters as those applied in Phase 1.

After completion of the planned combination phase, QSNYL treatment was continued as maintenance therapy. Treatment intervals for Sessions 14–16 were extended beyond monthly scheduling as part of an individualised treatment approach. The total treatment duration was approximately 26 months, from June 2023 to August 2025. **Figure 1** provides an overview of the treatment protocol administered.

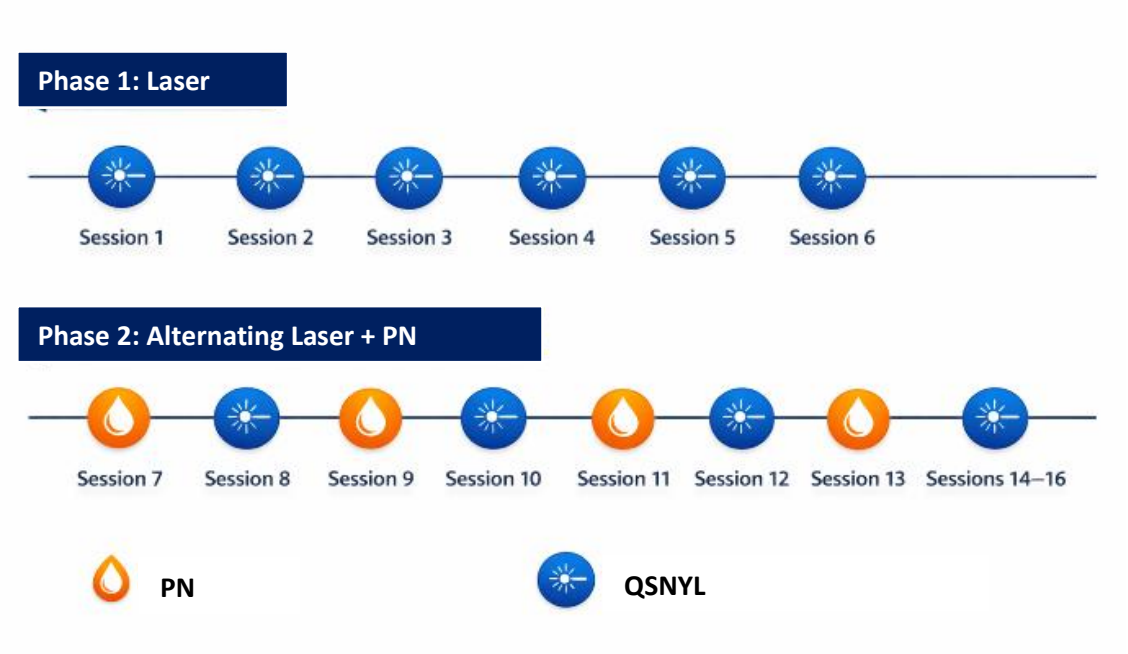

Figure 1. Schematic representation of the sequential two-phase QSNYL and PN treatment protocol. Phase 1 consisted of six QSNYL sessions performed at approximately 2-month intervals. Phase 2 involved alternating sessions of QSNYL and PN therapy. PN was administered for a total of four sessions, followed by continuation of QSNYL as maintenance therapy.

CLINICAL OUTCOMES

Standardized clinical photographs were obtained at predefined time points using consistent patient positioning, camera settings, and lighting conditions to facilitate objective visual comparison. Clinical outcomes were evaluated by both the clinician and the patient using the Global Aesthetic Improvement Scale (GAIS), a 5-point subjective scale comparing post-treatment appearance with baseline (1 = very much improved, 2 = much improved, 3 = improved, 4 = no change, and 5 = worse).

Progressive improvement in pigmentation was observed throughout the treatment course. During Phase 1, gradual lightening of solar lentigines was noted following repeated QSNYL sessions (**Figures 2B** and **3B**) compared with baseline (**Figures 2A** and **3A**), without evidence of worsening pigmentation or prolonged inflammatory response. Following the introduction of combination therapy in Phase 2 and subsequent maintenance treatment, further improvement in pigmentation was observed (**Figures 2C** and **3C**), accompanied by a more uniform skin tone and enhanced overall appearance of the bilateral lower limbs.

Following Phase 1, the patient-reported and clinician-assessed GAIS scores were 2 (much improved) and 3 (improved), respectively. After Phase 2, both scores improved to 1 (very much improved), as shown in **Table 1**.

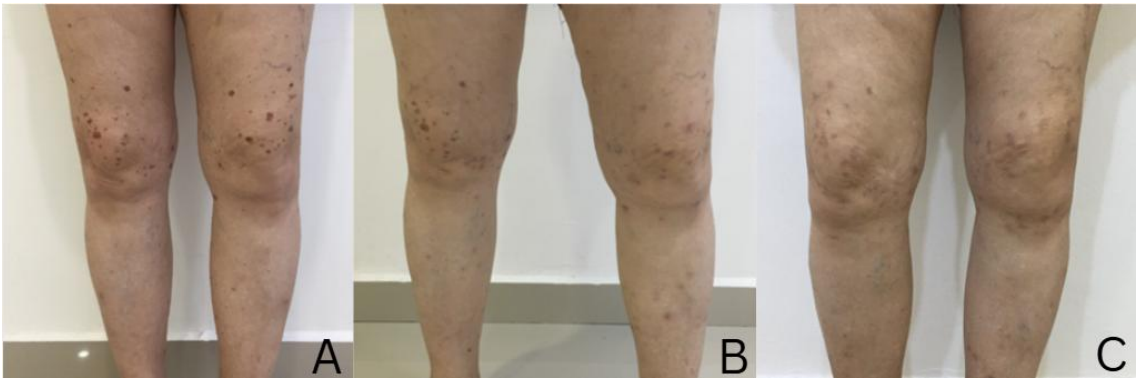

Figure 2. Anterior view of the lower limbs showing solar lentigines at **(A)** baseline, **(B)** after completion of Phase 1 (Session 6), and **(C)** after completion of Phase 2 (Session 16).

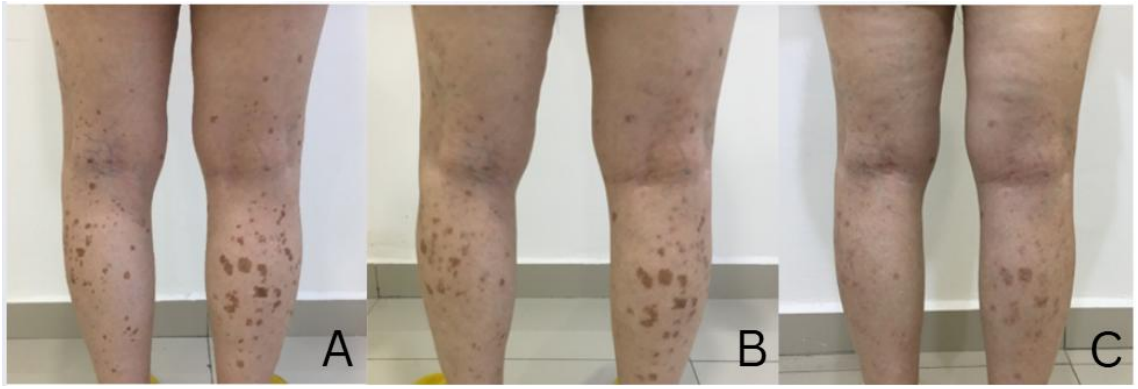

Figure 3. Posterior view of the lower limbs showing solar lentigines at **(A)** baseline, **(B)** after completion of Phase 1 (Session 6), and **(C)** after completion of Phase 2 (Session 16).

Table 1. GAIS scores across treatment phases.

Treatment Phase	Patient	Clinician
Phase 1	2	3
Phase 2	1	1

The patient tolerated both QSNYL and PN treatments well. Transient post-procedural erythema and mild pruritus were occasionally reported and resolved with conservative measures, including moisturisation, menthol-containing topical agents, and oral antihistamines as needed. No significant adverse events, such as blistering, scarring, or post-inflammatory hyperpigmentation, were observed throughout the treatment course. At the two-year follow-up after completion of Phase 2, clinical improvement was maintained, with sustained lightening of solar lentigines and no evidence of recurrence.

DISCUSSION

Chronic solar lentigines affecting the lower limbs may present a therapeutic challenge in aesthetic practice. Available treatments for lentigines include topical agents and energy-based devices, while laser therapy has demonstrated greater effectiveness compared with other treatment modalities, with a favourable safety profile [1].

In the present case, treatment was guided by a theoretical “break and build” concept. This approach refers to an initial pigment-targeting phase using laser therapy to fragment melanin (“break”), followed by a subsequent regenerative phase in which PN are introduced to support dermal recovery and improve overall skin quality (“build”). This sequential strategy was applied to achieve both pigment reduction and adjunctive improvement in skin quality.

Repeated QSNYL treatment during Phase 1 was associated with gradual lightening of pigmentation without significant adverse effects. This finding is consistent with previous studies demonstrating the efficacy of QSNYL in the treatment of solar lentigines [2–5]. In addition, comparative studies have reported superior efficacy and higher patient satisfaction with QSNYL than with cryotherapy, along with a lower incidence of adverse effects [10].

The introduction of PN therapy during Phase 2 represents a sequential combination approach in which a pigment-targeting modality was complemented by a treatment aimed at enhancing skin quality. While QSNYL continued to address residual pigmentation, PN was incorporated as an adjunctive biostimulatory treatment in the later phase. Previous studies have reported improvements in skin texture, elasticity, tone uniformity, and radiance following PN therapy in aesthetic applications [8,11]. In this context, PN may have contributed to the observed improvement in overall skin quality and tone homogeneity. Both QSNYL and PN treatments were well tolerated, with no serious adverse events reported throughout the treatment course.

CONCLUSION

This case demonstrates that a sequential treatment strategy combining QSNYL and PN therapy may be a safe and effective approach for managing chronic lower limb solar lentigines. A staged protocol involving initial pigment reduction followed by regenerative support was associated with sustained clinical improvement and high patient satisfaction at the two-year follow-up after the last treatment. Further studies are warranted to evaluate this approach in larger patient cohorts

and to establish standardized treatment protocols for lower limb pigmentary disorders, incorporating objective pigment quantification and controlled comparative designs.

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CONFLICT OF INTEREST

The author declares no potential conflicts of interest.

REFERENCES

1. Mardani G, Nasiri MJ, Namazi N, Farshchian M, Abdollahimajd F. Treatment of solar lentigines: a systematic review of clinical trials. Journal of Cosmetic Dermatology. 2025;24(4):e70133. DOI:10.1111/jocd.70133
2. Iraji F, Mousavi A, Poostiyan N, Saber M. Q-switched frequency-doubled Nd:YAG (532 nm) laser versus trichloroacetic acid 35% peeling in the treatment of dorsal hand solar lentigo: an assessor-blind split-hand randomized controlled trial. Journal of Cosmetic Dermatology. 2022;21(12):6776–82. DOI:10.1111/jocd.15385
3. Vachiramon V, Iamsumang W, Triyangkulsri K. Q-switched double frequency Nd:YAG 532-nm nanosecond laser vs. double frequency Nd:YAG 532-nm picosecond laser for the treatment of solar lentigines in Asians. Lasers in Medical Science. 2018;33(9):1941-7. DOI:10.1007/s10103-018-2560-3
4. Bohnert K, Dorizas A, Sadick N. A prospective, randomized, double-blinded, split-face pilot study comparing Q-switched 1064-nm Nd:YAG versus 532-nm Nd:YAG laser for the treatment of solar lentigines. Journal of Cosmetic and Laser Therapy. 2018;20(7-8):395-7. DOI:10.1080/14764172.2018.1439968
5. Kaminaka C, Furukawa F, Yamamoto Y. The clinical and histological effect of a low-fluence Q-Switched 1,064-nm neodymium: yttrium-aluminum-garnet laser for the treatment of melasma and solar lentigenes in Asians: prospective, randomized, and split-face comparative study. Dermatologic Surgery. 2017;43(9):1120-33. DOI:10.1097/DSS.0000000000001120
6. Kang HJ, Na JI, Lee JH, Roh MR, Ko JY, Chang SE. Postinflammatory hyperpigmentation associated with treatment of solar lentigines using a Q-switched 532-nm Nd:YAG laser: a multicenter survey. Journal of Dermatological Treatment. 2017;28(5):447-51. DOI:10.1080/09546634.2016.125433
7. Cavallini M, Bartoletti E, Maioli L, Massirone A, Palmieri IP, Papagni M, et al. Consensus report on the use of PN-HPT™ (polynucleotides highly purified technology) in aesthetic medicine. Journal of Cosmetic Dermatology. 2021;20(3):922-8. DOI:10.1111/jocd.13679
8. Lampridou S, Bassett S, Cavallini M, Christopoulos G. The effectiveness of polynucleotides in esthetic medicine: a systematic review. Journal of Cosmetic Dermatology. 2025;24(2):e16721. DOI:10.1111/jocd.16721
9. Weiss M, Mahoney AM, Gold M, Lawrence N. Leg rejuvenation: a combination approach: a review and our experience. Dermatologic Surgery. 2016;42 Suppl 2:S131-8. DOI:10.1097/DSS.0000000000000753
10. Dawood N, Tahir K, Shahid M, Aman S, Jawaid K, Ali U. Comparison of efficacy of cryotherapy vs Q-switch Nd:YAG laser in the treatment of solar lentigines. Journal of Pakistan Association of Dermatologists. 2020;30(2):277-81. DOI:10.66344/jpad.30.2.2020.1372
11. Lim TS, Liew S, Tee XT, Chong I, Lo FJ, Ho MJ, et al. Polynucleotides HPT for Asian skin regeneration and rejuvenation. Clinical, Cosmetic and Investigational Dermatology. 2024;17:417-31. DOI:10.2147/CCID.S437942

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