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Nevus of Ota with excellent response to Q-switched Nd:YAG (1064 nm) pigmented laser: a case report

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Consent for publication: the patient gave written informed consent to the publication of the details of her medical case and any accompanying images.

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Abstract

Nevus of Ota is a benign pigmentation disorder that commonly affects areas of the skin and eye supplied by the ophthalmic and maxillary branches of the trigeminal nerve. It typically presents as blue-black or gray macules, mainly in individuals with darker skin tones, and can cause significant cosmetic concerns. Treatment options include cryotherapy, dermabrasion, and laser therapy, with the Q-switched (QS) Nd:YAG (1064 nm) laser emerging as a promising option. This report describes the case of a 25-year-old woman diagnosed with unilateral nevus of Ota. After clinical examination, the patient was treated with the QS Nd:YAG laser, undergoing 12 treatment sessions over three years. A significant reduction in pigmentation was observed with no adverse effects. This case demonstrates the effectiveness of the QS Nd:YAG laser in managing nevus of Ota and highlights the importance of appropriate laser settings, patient selection, and post-treatment care. Laser therapy, particularly with the QS Nd:YAG laser, may offer a reliable and durable solution for reducing pigmentation and improving the cosmetic appearance of patients with this condition.

Introduction

Nevus of Ota, also known as “oculodermal melanosis” or “nevus fuscoceruleus ophthalmomaxillaris,” is an intrinsic pigmentary disorder commonly affecting areas innervated by the ophthalmic and maxillary divisions of the trigeminal nerve. It was first described by Ota and Tanino in 1939, with a high prevalence among individuals with darker skin tones. It commonly presents as unilateral, patchy, irregular, blue-black, or gray macules over the periorbital region, temple, malar prominence, forehead, and nose. Although a benign condition, nevus of Ota can cause psychological distress for patients due to its cosmetic appearance. Treatment options include cryotherapy, dermabrasion, and skin grafting, with laser therapy being the most recent approach.¹ Herein, we present a case of unilateral nevus of Ota with excellent and durable response to pigmented laser.

Case Report

A 25-year-old woman presented to the dermatology department in February 2021 for evaluation of pigmentation on the left side of the face since birth. She had no medical or surgical history or family history of similar lesions. On exam, she had ill-defined blue/gray patches involving the side of the face, including scleral involvement (Figure 1). She had no pigmentation of the oral mucosa.

She was diagnosed with nevus of Ota on a clinical basis and referred to ophthalmology for evaluation. She had normal eye pressure with mild dry eyes that were treated with artificial tears. As it was cosmetically affecting the patient, we planned to treat her with QS Nd:YAG (1064 nm) laser. After obtaining informed consent, the treatment area was anesthetized with EMLA cream, and a test spot with 1064 nm Q-switched laser over the left side of the face sparing the periorbital area was performed using 6 J/cm², 4 mm spot size, and 5 Hz pulse width. The patient was seen for a follow-up six weeks later with no side effects. Subsequent sessions were held over a three-year period with a 6- to 8-week interval in between, using the same parameters, and improvement was noted after each session. Over the course of 12 sessions, the patient achieved a significant reduction in pigmentation. Laser parameters were consistently set at 6 J/cm², 4 mm spot size, and 5 Hz pulse width. The patient continued to show excellent response with complete resolution of the nevus and no adverse effects (Figure 2).

Discussion

The nevus of Ota was initially documented by Hulke in 1860, but Ota provided a more detailed description in 1939.² It is a benign form of melanosis that primarily affects areas supplied by the trigeminal nerve, particularly the ophthalmic and maxillary divisions. It results from an abnormal migration of melanoblastic cells of the primitive neural tube along the first and second divisions of the trigeminal nerve during embryogenesis.² This condition leads to hyperpigmentation in the eye and is also referred to as ocular dermal melanosis.³ Nevus of Ota is more prevalent among Asians, affecting approximately 0.014% to 0.034% of the population, and is more common in females with a ratio of 5:1. Although it usually manifests at birth, it can also emerge during puberty or pregnancy, influenced by hormonal changes. The condition is less frequently seen in individuals of Caucasian descent.⁴

The pathogenesis of this condition is unknown, but several theories have been put forward, which include: i) dropping-off of epidermal melanocytes; ii) migration of hair bulb melanocytes; iii) reactivation of pre-existing latent dermal melanocytes, which are triggered by dermal inflammation, UV radiation, or hormonal changes during pregnancy.^{2,4}

The distinctive gray-blue pigmentation results from melanocytes being trapped in the skin. This condition typically appears unilaterally, affecting the conjunctiva, sclera, and corresponding facial

skin. Patients face an elevated risk of developing uveal melanoma and glaucoma, and some may experience pigmentation in the palate.

The lesions usually appear as unilateral macules that can be patchy, with shades ranging from brown to slate blue. These macules are flat, non-hairy, and have poorly defined edges, sometimes extending to the eyes and mucosal areas. Diagnosis relies on clinical evaluation and patient history, while dermoscopy reveals homogeneous bluish to slate-gray pigmentation. A biopsy may be necessary if there are changes in the skin, such as ulceration or new papules.⁵

The primary concern for patients is cosmetic, leading many to seek dermatological advice for evaluation or laser treatment. Treatment is primarily cosmetic but may be warranted if there's a risk of malignancy. Pulsed Q-switched laser surgery is the preferred method, effectively targeting and reducing pigmentation by destroying melanocytes. Other treatment options include chemical peels, dermabrasion, electrocautery, and cryotherapy, with the Q-switched alexandrite laser being particularly effective for treating pigmented lesions.⁶

Nevus of Ota has been treated effectively with lasers, including the 1064 nm picosecond Nd:YAG laser, used for pigmented disorders. However, research on its use for nevus of Ota is limited. A study by Yang *et al.* evaluated the safety and efficacy of this laser in 16 subjects with Fitzpatrick skin type IV, using 1 to 5 sessions at 3 to 12-month intervals. The laser applied a mean fluence of 1.8-4.3 J/cm². After one session, the average efficacy score was 2.56, increasing to 3.15 after two sessions and 3.51 after three. Only one patient experienced post-inflammatory hyperpigmentation, indicating that the 1064 nm picosecond Nd:YAG laser is effective and safe for treating nevus of Ota.⁷

Another study by Xiao *et al.* focused on personalized laser therapy, using a local thermal non-equilibrium model to optimize laser parameters based on melanin depth and volume. The study found that a pulse duration of 15 to 150 ns limited heat transfer in hyperplastic melanin, with 50 ns preferred to minimize energy absorption in normal epidermal melanin.⁸

Winaya *et al.* also reported successful nevus of Ota treatment using a 755 nm picosecond alexandrite laser after limited results with the QS Nd:YAG laser. The picosecond laser, applied at 2.5 Hz and 1.59 J/cm², showed significant improvement after six sessions, with further enhancement 21 days post-treatment.⁹

Conclusions

This case report highlights the successful treatment of nevus of Ota with almost complete resolution with the use of QS Nd:YAG (1064 nm) laser.

Understanding the mechanisms of action, the utilized parameters, candidates selected, after-laser care, patient education, and expectations are essential for achieving optimal results while minimizing risks and complications.

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Figure 1. First visit to the dermatology clinic, February 2021. a,b) ill-defined blue/gray patches involving the left of the face; c) scleral involvement.



Figure 2. December 2024. Significant reduction in pigmentation.

