

# CASE REPORT: Treatment of Nevus of Ota with 1064 nm Q-Switched Nd:YAG

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## ABSTRACT

Nevus of Ota is characterized as hamartoma of dermal melanocytes, clinically presented as a blue or grey patch on the face. Until the introduction of laser technology into clinical practice, there were no effective therapeutic options to treat nevus of Ota. With the introduction of Nd:YAG and Alexandrite laser technologies, Q-switched laser treatment for nevus of Ota had become the method of choice.

To elucidate the efficacy and safety of 1064 nm Q-switched Nd:YAG laser treatment for nevus of Ota, four cases were included in a study. After an average of five treatment sessions, all four patients showed significant cosmetic improvement with no side effects observed.

On the basis of our experiences, 1064 nm Q-switched Nd:YAG laser represents a safe and effective method to treat nevus of Ota.

**Key words:** Nevus of Ota, Q-switched Nd:YAG laser

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## I. INTRODUCTION

Nevus of Ota (nevus fuscoceruleus ophthalmomaxillaris) is characterized by benign hamartomatous hyperpigmentation, clinically presented as a congenital or acquired blue or gray patch on the face, distributed on the ophthalmic and maxillary branches of the trigeminal nerve [1]. Though most cases of nevus of Ota are unilateral (90%), in 5 to 10% of cases pigmentation can occur bilaterally and may involve ocular, nasal and oral mucosal surfaces. Nevus of Ota is most commonly found in Asians and affects around 0.5% of the population. The incidence is higher in females (male: female ratio 1:4.8) [2]. Although intraocular and central nervous system malignant melanomas are more common in patients with nevus of Ota, the prevalence is still less than 4% [3,4].

The treatment options for nevus of Ota have been rather limited before the introduction of laser technology into clinical dermatology. The options involved cryotherapy [5,6] skin abrasion [7], microsurgical excision treatment [8] and cosmetic camouflage. Most of the early treatments were associated with hyperpigmentation and the development of scars. Later, numerous publications have shown the applicability of different types of Q-switched lasers for the treatment of Nevus of Ota. Geronemus [9] and Goldberg and Nychay [10] were the first to report the successful laser treatment of nevus of Ota using a Q-switched ruby laser, and various authors supported their findings [11–14]. A retrospective study of the long-term complications after treatment with Q-switched ruby laser showed high levels of hypopigmentation that can be permanent. In recent years Q-switched Nd:YAG [15–19] as well as Alexandrite lasers [17, 20–22] have become a gold standard for the treatment of nevus of Ota.

In the present study, four cases of successful treatment of nevus of Ota using 1064 nm Q-switched Nd:YAG are described, confirming the efficacy as well as safety of this treatment for nevus of Ota.

## II. CASES

### a) Case 1

The first patient presented with a nevus of Ota on the left side of the face, showing discoloration which was more pronounced around the eye socket and faded toward the outer regions of the face. To lighten the nevus of Ota, six treatments were performed using the Fotona QX (Fotona, Slovenia). Topical anesthesia was applied (EMLA or Ela-Max) before the treatment. Cryo air cooling was performed after the procedure with a unit set at cooling level 5 or 6. Eye shields were used for eye protection. The fluence settings were determined for each treatment based on the desired end effect. Starting with a low setting of 2 J/cm<sup>2</sup>, fluence was gradually increased by 0.5 or 1 J/cm<sup>2</sup> until the treated area began to turn white and crusty.

To allow adequate time for recovery, the treatment sessions were performed at two-month intervals. To

deliver a clinically significant amount of energy and at the same time obtain a wide area of rejuvenation, a larger (6 mm) spot size and low fluence were used during the last two treatments. For successful treatment of nevus of Ota, fluence settings between 2-12.5 J/cm<sup>2</sup> were used. Significant improvement in skin coloration at the end of treatment was observed at the end of the treatment as presented in Fig.1.



Figure 1: Nevus of Ota in a female patient before (left) and after (right) six treatments with a Q-switched Nd:YAG laser.

**b) Case 2**

A young female patient with a mild Nevus of Ota on the left side of the face was referred to our clinic. The skin discoloration was almost eliminated after a series of three treatments performed at two-month intervals with a Q-switched Nd:YAG laser (Fotona QX, Fotona, Slovenia). To reduce pain, the topical aesthetic (EMLA or Ela-Max) was used before each treatment. To achieve desirable results, the fluence settings that were set for each treatment started with a low fluence (2 J/cm<sup>2</sup>) and were increased in 0.5 or 1 J/cm<sup>2</sup> increments until a white and crusty effect on skin was observed on the treated area. The Cryo unit used for cooling the treated area was set at level 5 or 6. Stable results were observed two months after the third treatment.

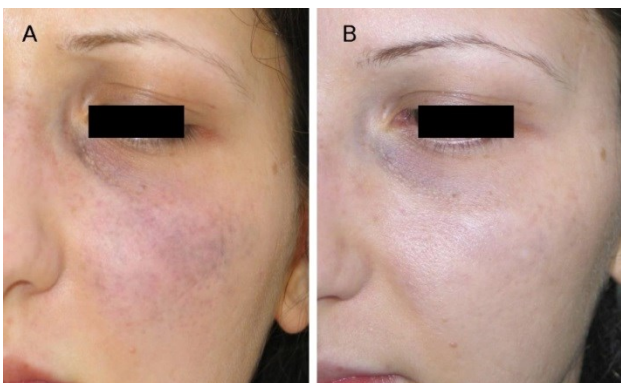


Fig. 2: Female patient with mild signs of nevus of Ota: Before (left) and after completed treatment with Q-Sw Nd:YAG.

**c) Case 3**

A 25-year-old female patient with a severe case of nevus of Ota on the nose and the left side of the face was treated with Q-switched Nd:YAG laser. Before each treatment, topical anesthetic was used (EMLA, AstraZeneca, Sweden or Ela-Max). Seven treatment sessions at 2-month intervals were performed in two passes. The parameters of the first pass were set with fluence ranging between 2.5 and 3.4 J/cm<sup>2</sup> with 10 Hz frequency and 6 mm spot size. The parameters of the second pass were set with fluences between 5.4 and 7.6 J/cm<sup>2</sup> and with 10 Hz frequency and 4 mm spot size. Cooling was performed with the cryo cooling unit set at level 5 or 6. Application of Bepanthen cream (Bayer, Germany), and sunscreen was suggested after the treatment. Significant cosmetic improvement was visible after seven treatments with the Q-switched Nd:YAG laser.



Figure 3: Nevus of Ota in a female patient before (left) and after (right) the Q-switched Nd:YAG laser treatment.

**d) Case 4**

A 25-year-old female patient with a nevus of Ota on the left side of the face was treated with Q-switched Nd:YAG laser. Six treatment sessions at 2-month intervals were performed in two passes. The parameters of the first pass were set with fluence ranging between 2.5 and 3.3 J/cm<sup>2</sup> and with 10 Hz frequency and 6 mm spot size. The parameters of the second pass were set with fluences between 5 and 7.6 J/cm<sup>2</sup> with 10 Hz frequency and 4 mm spot size. Before each treatment, topical anesthetic was used (EMLA or Ela-Max). For additional reduction of pain, cooling was also performed. Post-treatment care included the application of Bepanthen cream and sunscreen. After the last treatment with Q-switched Nd:YAG laser the pigmented lesions were completely resolved.



Figure 4: Complete removal of pigmented lesions: (a) before and (b) after Q-switched Nd:YAG laser treatment.

### III. DISCUSSION

In our case report the successful 1064 nm Q-switched Nd:YAG laser treatment of nevus of Ota is describe in four cases. After an average of five treatment sessions all four patients showed significant cosmetic improvement. The number of sessions depended on the severity of nevus of Ota. We also observed that the treatment sessions may vary depending on the color of the lesion, which defines the depth of the lesion. To treat gray lesions, which are deeper as seen in Cases 1, 3 and 4, more sessions were needed to obtain good results. For brown colored lesions, which are more superficial as seen in case 2, only three treatment sessions were needed to accomplish stable results. To improve the treatment results, a second pass was added as described in Cases 3 and 4. Significantly better results were observed using additional passes with a 6 mm spot size, which enables penetration in deeper layers of the dermis.

To evaluate the safety of the treatment, the appearance of textural changes, scarring and change of pigmentation was monitored.

Only short-term side effects limited to skin whitening, which presented the end point of the treatment, followed by the site crusting lasting for up to a week after the treatment, were observed and corresponded to those described in previous studies [18,23–25].

Q-switched 1,064 nm Nd:YAG laser is often considered as first choice for treatment of nevus of Ota because its long wavelength is preferentially absorbed in melanin, allowing deeper penetration into the skin to target dermal melanocytes. In one comparative study using three different wavelength lasers (1064, 755, and 532), the 1064 nm Q-switched Nd:YAG laser was proven to be the most effective for treatment of nevus of Ota, with 97% of efficacy and no side effects observed [27].

Hypopigmentation or hyperpigmentation present the most common long-term side effect after treatments with Q-switched lasers. In comparison with other lasers used, Q-switched Nd:YAG was reported to be the safest, with hypopigmentation affecting 7.6% of the patients, whereas the frequency after treatments with Q-switched alexandrite is 10.5% and with Q-switched ruby 16.8%. Hyperpigmentation had occurred in 5.9% of the patients after treatment with Q-sw ruby, in 3.5% with Q-sw alexandrite and in 2.9% with Q-sw Nd:YAG laser [23,24]. Recurrence is also one of the most undesirable long-term side effect with 1% frequency described for Q-sw alexandrite and Q-sw Nd:YAG treatments and 7% for ruby laser treatments [23–26].

No long-term side effects were observed in any of our four patients. To avoid the risk of hyperpigmentation, our patients were strongly advised to use sun protection.

With our results we can support previous reports about the safe and effective use of 1064 nm Q-switched Nd:YAG for the treatment of nevus of Ota.

### IV. CONCLUSIONS

Significant cosmetic improvement with only short-term side effects characteristic for Q-switched laser treatment was observed in all four patients. On the basis of our observations, the 1064 nm Q-switched Nd:YAG laser represents a safe and effective method of choice to treat nevus of Ota.

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