



755-nm Q-switched Alexandrite laser as a treatment for melanonychia caused by onychomycosis

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4 **755-nm Q-switched Alexandrite laser as a treatment for melanonychia caused by**
5 **onychomycosis**
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Introduction

Melanonychia is defined as brown or black pigmentation on a nail caused by melanin and other exogenous pigments. While the most common causes are benign nevi, trauma, onychomycosis, or medications, melanonychia may be a result of a subungual melanoma. When it is the result of a benign condition, patients may desire treatment for aesthetic reasons.

The 755-nm Alexandrite Q-switched laser causes highly selective destruction of pigment-laden cells because the wavelength is highly absorbed by melanin relative to other optically absorbing structures in the skin. This laser is effective for both epidermal and dermal pigmented lesions.¹ Here, we describe two cases of melanonychia combined with onychomycosis that were treated using a single session of 755-nm Alexandrite laser with successful resolution.

Case report

Case 1

A 58-year-old Korean woman presented with longitudinal black pigmentation with fungal infection on the right big toe nail (Figure 1A). We treated the onychomycosis first with a 5% amorolofine nail lacquer (Loceryl[®], Galderma Ltd., Watford, UK) and 1,064-nm Nd:YAG laser (Pinpointe[™] FootLaser[™], Nuvolase Inc., Chico, CA). There was improvement of distal onycholysis and yellowish discoloration, but the longitudinal black pigmentation remained. We treated the longitudinal melanonychia with a 755-nm Q-switched Alexandrite laser (AlexTriVantage, Candela Laser Corporation, Wayland, MA, USA) using a 3-mm spot size and 50-nanosecond pulse duration with 6 J/cm². At the follow-up visit 1 month after a single treatment, the patient showed marked improvement in the hyperpigmentation (Figure 1B).

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4 There were no side effects from any of the laser treatments.
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6 **Case 2**

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9 A 57-year-old woman visited our clinic with yellowish hyperkeratotic change of the left big
10 toe nail and a longitudinal black pigmentation with nearly total dusky yellow-brownish color
11 change on the right big toe nail (Figure 2A). She was first treated with amorolofine nail
12 lacquer and 1,064-nm Nd:YAG laser for onychomycosis. The left big toe nail showed
13 improvement but the black pigmentation of the right big toe nail showed very little
14 improvement. The pigmented lesion was treated with a 755-nm Q-switched Alexandrite laser
15 using a 3-mm spot size and 50-nanosecond pulse duration with 6 J/cm², and the lesion was
16 totally resolved with no remaining black pigmentation on the right big toe nail (Figure 2B).
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31 **Discussion**

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34 Melanonychia, a medical condition in which the nail plate has a pigmentation band that is
35 either black or brown in color, is a diagnostic challenge. The most serious disease of the nail
36 unit, melanoma, primarily presents with melanonychia. However, melanonychia most often
37 occurs as a result of benign etiologies such as nail matrix melanocytic activation, nail matrix
38 melanocytic hyperplasia, and nail invasion by melanin-producing pathogens. In [a recent](#)
39 Korean study, the most common cause was subungual hemorrhage, followed by nail matrix
40 nevus, trauma-induced pigmentation, nail apparatus lentigo, and ethnic-type nail
41 pigmentation. In the case of fungal melanonychia, the lesions most commonly involving the
42 toenails, yellowish streaks with jagged borders composed of spikes are observed in addition
43 to the dark pigment streak with distal widening.²
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4 If melanonychia is secondary to systemic and/or dermatologic disease, treatment of the
5 underlying condition is helpful. If the condition is caused by a certain drug the
6 recommendation is to stop taking that particular medication and the lesion will fade following
7 withdrawal. In cases where there is a suspicion of melanoma, the doctor will recommend a
8 biopsy of the lymph nodes to be performed as well. The management of melanoma of the nail
9 unit requires complete excision of the tumor, which may require amputation of part of the
10 digit. If the melanonychia is caused by a benign condition and there are no other symptoms
11 associated with the condition, generally no further treatment will be recommended by the
12 specialist. However, in the author's clinical practices, some affected patients want to
13 eliminate the pigmented lesion for cosmetic, psychological, and social reasons.
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27 In the two cases presented here, the yellowish and hyperkeratotic lesions improved after
28 combined treatment for onychomycosis but the longitudinal black pigmentation remained.
29 Fungal melanonychia is a relatively uncommon nail infection caused by species of fungus
30 that produce melanin pigment, but the number of organisms implicated as etiologic agents of
31 fungal melanonychia is increasing.³ These fungal melanonychia are often not responsive to
32 traditional antifungal therapy. There is growing evidence that melanin may play an important
33 role in the pathogenesis of fungal melanonychia, suggesting that inhibitors of melanin
34 biosynthesis might reduce the pathogenic potential of many fungi and may be an effective
35 adjunct to antifungal therapy.⁴
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47 The 755-nm Q-switch Alexandrite laser is known to induce selective photothermolysis of
48 pigmented lesions because absorption of laser energy by melanin predominates over
49 absorption by hemoglobin at these wavelengths. Previous studies have shown excellent
50 absorption by black pigment.^{1,5} Laser treatment was performed for black nail pigmentation in
51 two patients using the 755-nm Q-switched Alexandrite laser set at an energy of 6.0 J/cm²
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4 with a 3-mm spot size, and there was marked clearance of pigmentation of the nails with a
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6 single laser treatment in both patients. Transient whitening of the nail surface was observed
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8 immediately after irradiation, but recovered within 1 day, and mild pain was observed during
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10 treatment without any anesthesia, but disappeared within several minutes. There were no
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12 other post-treatment changes such as onycholysis or onychodystrophy.
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15 Physicians should always consider that some patients with melanonychia face a cosmetic,
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17 social and psychological burden and would want to remove the lesion. We should keep in
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19 mind that we must exclude melanoma before treating melanonychia for cosmetic purpose.
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21 When it is the result of a benign condition, the 755-nm Q-switched Alexandrite laser may be
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23 considered a reasonable therapeutic option for the treatment of these pigmented lesions.
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26 Further controlled clinical trials involving larger numbers of patients are needed for the
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28 optimization of treatment protocols and confirmation of the efficacy of treatment.
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Figure Legend

Figure 1. (A) Longitudinal black pigmentation with fungal infection on the right big toe nail. (B) One month after a single treatment with a 755-nm Q-switched Alexandrite laser, the patient showed marked improvement in hyperpigmentation.

Figure 2. (A) Yellowish hyperkeratotic change in left big toe nail and longitudinal black pigmentation with nearly total dusky yellow-brownish colored changes on the right big toe nail. (B) One month after a single treatment with 755-nm Q-switched Alexandrite laser the lesion had resolved resulting in no black pigmentation on the right big toe nail.

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Figure 1. (A) Longitudinal black pigmentation with fungal infection on the right big toe nail. (B) One month after a single treatment with a 755-nm Q-switched Alexandrite laser, the patient showed marked improvement in hyperpigmentation.

94x35mm (300 x 300 DPI)

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Figure 2. (A) Yellowish hyperkeratotic change in left big toe nail and longitudinal black pigmentation with nearly total dusky yellow-brownish colored changes on the right big toe nail. (B) One month after a single treatment with 755-nm Q-switched Alexandrite laser the lesion had resolved resulting in no black pigmentation on the right big toe nail.

115x48mm (300 x 300 DPI)

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