Case report

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Case report

1,064-nm and 532-nm picosecond neodymium-doped:yttrium-aluminum-garnet laser treatment for longitudinal melanonychia: a case report

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Melanonychia is a common pigmentary disorder characterized by black or brownish longitudinal pigmentation of the nail plate. It is usually benign but can cause aesthetic concerns. Herein, we describe the case of a 29-year-old female diagnosed with benign longitudinal melanonychia, and treated with two different wavelengths of picosecond neodymium-doped:yttrium-aluminum-garnet (ps Nd:YAG) laser. The lesion was divided into two halves. The proximal half was treated with a 1,064-nm ps Nd:YAG laser and the distal half was treated with a 532-nm ps Nd:YAG laser. After a single treatment session, both sides exhibited immediate and marked improvement. However, after three weeks pigmentation that had grown out from the nail matrix was evident on the proximal nail plate. This case suggests that ps Nd:YAG lasers may be effective for immediate resolution of pigmentation on the nail plate, but fundamental treatment of the nail matrix is necessary to prevent recurrence.

Key words: Nail; Pigmentation; Laser

INTRODUCTION

Melanonychia is defined as brown or black pigmentation on a nail, typically starting proximally at the base and extending distally to the tip. This condition can affect one or more nails and may be caused by various factors, including trauma, inflammation, infections, medications, and underlying medical conditions. The two main types are longitudinal melanonychia (LM) and transverse melanonychia. LM is also known as melanonychia striata and is characterized by longitudinal streaks within the nail plate from the proximal nail fold to the distal part of the nail plate. Transverse melanonychia presents as a dark band that stretches across the width of the nail. It is less common than LM [1].

Melanonychia usually occurs as a result of benign etiologies, and melanocytic origins can be classified based on the mechanisms involved, such as nail matrix melanocytic activation, nail matrix melanocytic hyperplasia, and nail invasion by melanin-producing pathogens [2]. The treatment of melanonychia depends on its underlying cause. When it is a result of a benign condition patients may desire treatment for aesthetic reasons [3]. Herein we describe the case of a 29-year-old female with LM caused by melanocytic activation with benign clinical features. The condition responded to picosec-

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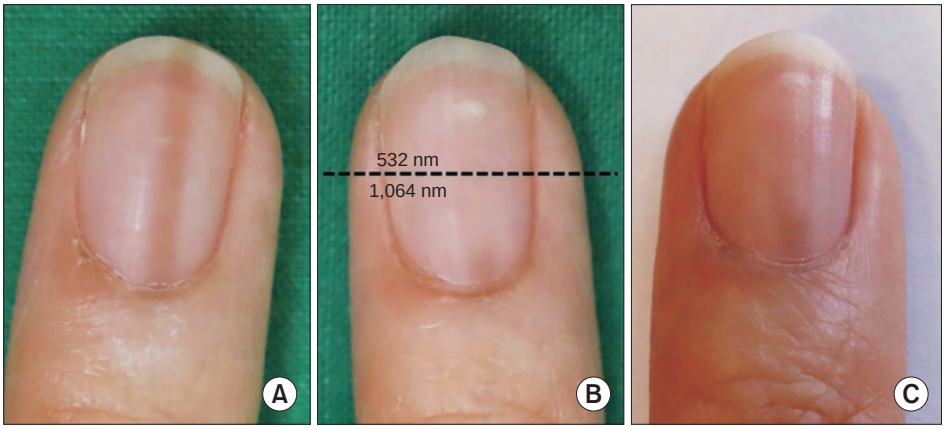

Fig. 1. (A) Brownish longitudinal demarcated streak on the right 4th fingernail. (B) Immediate improvement on both the 532-nm and 1,064-nm picosecond neodymium-doped:yttrium-aluminum-garnet laser treatment sides after one treatment session. (C) After 3 weeks, pigmentation reemerging from the nail matrix was observed.

ond neodymium-doped:yttrium-aluminum-garnet (ps Nd:YAG) laser treatment, but the case also indicated that fundamental treatment of the nail matrix is necessary to prevent recurrence.

A written informed consent was obtained from the patient for the publication of this case report.

CASE REPORT

A 29-year-old femeal presented with a homogeneous brownish longitudinal demarcated streak on the right fourth fingernail that had developed 8 years ago (Fig. 1A). On physical examination size increment was observed, but Hutchinson's sign was negative and there were no other findings suggesting malignancy. Based on a diagnosis of benign LM, the patient was administered ps Nd:YAG laser (Picoplus; Lutronic Corp.) treatment. After dividing the lesion into two halves, the proximal half was treated with 1,064-nm ps Nd:YAG laser (4-mm spot, 1.5 J/cm^2, 1 pass), and the distal half was treated with 532-nm ps Nd:YAG laser (2-mm spot, 0.5 J/cm^2, 1 pass). The patient tolerated the procedure well, with only mild stinging during treatment. The nail pigmentation was whitened immediately after the first treatment session although a small portion of the pigmentation was left on the proximal nail plate since laser treatment was performed to avoid damaging the proximal nail fold (Fig. 1B). At 3 weeks however, pigmentation that had grown out from the nail matrix was evident on the proximal nail plate adjacent to the proximal nail fold, and thus, the overall residual pigmentation became longer and more evident (Fig. 1C).

DISCUSSION

As mentioned above, melanocytic origins of melanonychia can be classified based on the mechanisms involved which includes nail matrix melanocytic activation, nail matrix melanocytic hyperplasia, and nail invasion by melanin-producing pathogens [2]. Melanocytic activation refers to increased melanocyte activity without a significant increase in the number of cells. In this process existing melanocytes produce more melanin, leading to pigmentation changes in the nail. Melanocytic activation can occur in response to various stimuli such as trauma, inflammation, hormonal changes, and medications. Melanocytic hyperplasia involves an increase in the number of melanocytes within the nail matrix, resulting in an overgrowth of pigment-producing cells. This can lead to thicker, more pronounced pigmented bands or areas within the nail. Melanocytic hyperplasia may occur as a reactive process in response to stimuli such as chronic irritation or inflammation, or genetic factors [4].

Melanocytic activation is characterized by hyperpigmentation of the matrix epithelium on microscopic examination, secondary to activation of suprabasal layer melanocytes in the proximal matrix and basal layer melanocytes in the distal matrix. On dermoscopic examination, visualization of gray or brown to black lesions is also an important indicator melanocytic activation or proliferation. Grayish black, regular parallel lines in LM due to melanocytic activation are usually lighter than those seen in LM due to melanocytic proliferation [5].

Picosecond lasers, initially used in tattoo removal, have yielded some promising results with respect to the treatment of melasma and other benign pigmented lesions. picosecond lasers with shorter laser pulse durations result in pigment fragmentation, which is more a result of photoacoustic effects than photothermal effects [6]. Picosecond laser treatment may be an efficient alternative for nail pigmentation removal, based on its selective photomechanical effects with minimal thermal damage to surrounding tissue, and little nail damage.

Consistent with the above-described reasons there have been several reports of ps Nd:YAG lasers being used to treat melanonychia [7,8], but to date there have been few direct comparisons of the two commonly used wavelengths. In the current patient the lesion was divided into two halves, then the proximal half was treated with a 1,064-nm ps Nd:YAG laser and the distal half was treated with a 532-nm ps Nd:YAG laser. After a single treatment both wavelengths yielded immediate and relatively excellent results with respect to removal of pigmentation in the nail plate, but did not show a complete therapeutic effect. Moreover, after 3 weeks pigmentation that had grown out from the nail matrix was evident on the proximal nail plate.

The present case suggests that both 1,064-nm and 532-nm ps Nd:YAG lasers may be effective for immediate resolution of pigmentation on the nail plate, but fundamental treatment of the nail matrix is necessary to prevent recurrence. One limitation of the current report is that there was no definite pathological diagnosis of single LM in the patient. The diagnosis was dependent on clinical evaluation by physicians. Another limitation of the present investigation is that the efficacy of laser treatment was evaluated only in one patient. Controlled clinical trials involving multiple patients are needed for the optimization of treatment protocols, and confirmation of the efficacy of treatment modalities.

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AUTHOR CONTRIBUTIONS

Conceptualization: KHY, HSH. Data curation: YHL, KRK. Formal analysis: YHL, KRK. Investigation: YGK, SYC. Methodology: YGK, HSH. Writing–original draft: HSH, SYC. Writing–review & editing: all authors.

CONFLICT OF INTEREST

Kwang Ho Yoo is the Editor-in-Chief, and Hye Sung Han is editorial board members of the journal, but they were not involved in the review process of this manuscript. Otherwise, there is no conflict of interest to declare.

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DATA AVAILABILITY

None.

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SUPPLEMENTARY MATERIALS

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