

## Duration Period of Treatment Effect of the 1,064 nm Neodymium-doped Yttrium Aluminum Garnet Laser to Treat Onychomycosis

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Dear Editor:

Recently, the neodymium-doped yttrium aluminum garnet (Nd:YAG) laser has reportedly shown good clinical efficacy in treating onychomycosis<sup>1</sup>. Although several studies discuss the effectiveness of laser treatment for the management of onychomycosis, there exists limited research describing the duration of therapeutic efficacy after laser treatment. In this study, we aimed to evaluate the duration of the persistence of the therapeutic efficacy of the 1,064 nm Nd:YAG laser for the management of onychomycosis (IRB KHUH 2017-07-035). We retrospectively reviewed 1-year follow-up records of patients who had participated in our previous study involving the Nd:YAG laser (Pinpointe™ Footlaser™, Pinpointe USA Inc., Chico, CA, USA) to treat onychomycosis between February 2014 and November 2015<sup>2</sup>. We studied 37 patients who underwent 3 or 4 laser treatments at 4-week intervals using the following settings: Pulse energy 200 mJ, pulse width 0.1 ms, spot size 1.5 mm, frequency 30 Hz, and temperature 40~60°C (Fig. 1). The topical antifungal agent naftifine hydrochloride was concomitantly used in 18 patients of laser combined with topical group. Clinical effect was evaluated by measuring the increase in the vertical length of nails that appeared to be normal at follow-up visits; however, 1 patient could not follow up because he died due to unrelated cardiomyopathy. Among 36 patients, 11 (30.6%) showed an excellent response based on clinical photographs, and 25 (69.4%)

showed a moderate-to-poor response. After laser treatment, most patients continued the use of topical antifungal agents. We checked when the deterioration or recurrence was occurred in the photos or chart record, and calculated the maintenance period of the laser treatment. We observed that patients who had demonstrated an excellent response maintained their improved state of health over a mean period of 6.7 months after discontinuing laser therapy. Among the 25 patients who demonstrated a moderate-to-poor response, 23 (92%) remained in their previous state of health over a mean period of 2.2 months and 2 (8%) showed worsening 1~2 months after cessation of laser treatment (Fig. 1 and 2).

Onychomycosis is difficult to cure and the recurrence (relapse or re-infection) rate of onychomycosis reported by various studies ranges between 10 and 53%<sup>3</sup>. A study evaluating the recurrence of onychomycosis after successful systemic antifungal treatment demonstrated that 12 of the 73 patients (16.4%) studied developed recurrence within a mean period of 36 months after treatment<sup>3</sup>. Lasers have gained acceptance as a new treatment modality for the treatment of onychomycosis, and the U.S. Food and Drug Administration has approved the use of several lasers to achieve a 'temporary increase in clear nails in patients with onychomycosis'<sup>4</sup>. In a previous study, patients received 2 treatment sessions of the 1,064-nm Nd:YAG at a fluence of 5 J/cm<sup>2</sup> and when followed-up 3 months later, those treated with laser showed greater

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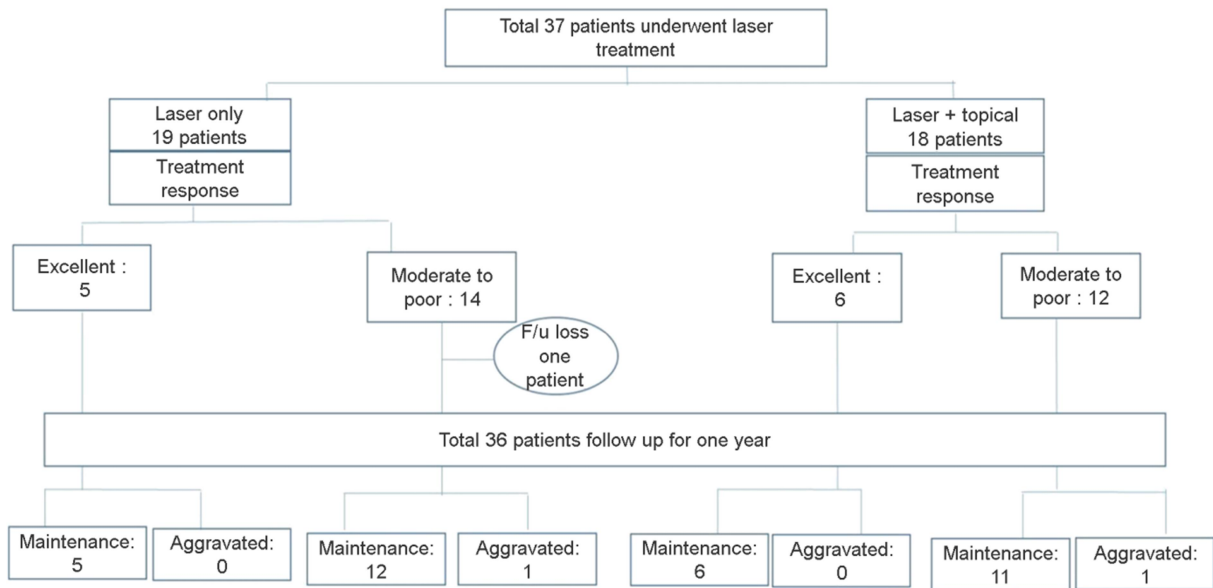


Fig. 1. Flow diagram showing follow-up results in 37 patients who participated in our study



Fig. 2. Clinical photographs showing that the effect of laser treatment was temporarily sustained. **A.** Treatment response was excellent and remained the effect for approximately 7 months after laser. **B.** Treatment response was moderate to poor and remained the effect for 1 month. **C.** Treatment response was moderate to poor and remained the effect for approximately 4 months. **D.** Treatment response was moderate to poor and aggravated after treatment.

proximal nail plate clearance than that observed in controls. However, 12 months later, the modest improvement in proximal nail plate clearance seen in the laser group was not observed to be sustained<sup>5</sup>. In our study, we observed that patients who showed an excellent treatment effect additionally showed persistence of the treatment efficacy over a longer period than that observed in those who showed a moderate/poor treatment effect. However, despite the excellent response, the mean persistence of the therapeutic efficacy of laser treatment was less than 1 year. Limitations of this study are the small sample size and assessment of treatment response based on clinical photographs as opposed to mycological confirmation of improvement. The duration of laser treatment for onychomycosis has been limited and further research is needed on strategies to maintain the effectiveness of treatment.

**Key Words:** Fungus, Laser, Nd:YAG, Onychomycosis

## CONFLICT OF INTEREST

In relation to this article, I declare that there is no conflict of interest.

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