

Complete Restoration of a Toenail Compromised by Onychomycosis, Using a Novel 650-microsecond Pulsed Nd:YAG 1064nm Laser

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Background and Objective

74 year old male presented to the practice after a blunt trauma to the big toe. Prior to the injury the nail was severely affected by onychomycosis. It was about 3mm thick and disfigured. At the time of evaluation patient presented with subungual hematoma and nail plate partially detached. Laser therapy was selected because previous treatments by other modalities were not effective.

One of the key aspects of eradicating Onychomycosis is to achieve penetration of the laser energy into the nail matrix, thus requiring a deep-heating and powerful laser. The microsecond Nd:YAG 1064nm laser is ideal a much deeper penetrating modality than diode lasers, or Q-switched Nd:YAG lasers which energy is absorbed superficially on the surface of the skin and can not travel deep into skin tissue.

Materials and Methods

The 1064nm laser modality has been proven to be effective in clearing Onychomycosis, as long as the pulse duration is in the microsecond range and the fluence is at least 40-50 joules per square centimeter. Such a microsecond Nd:YAG laser (the LightPod Forte laser from Aerolase, Tarrytown, NY) was used to treat this patient. After injection with local anesthesia and sterile prep, the remnant of the nail was removed and hematoma evacuated. The nail bed was cleaned and dried, and laser energy was applied at a spot size of 5mm, fluence of 41 j/cm² and 650 microsecond pulse duration, with two complete passes applied to the full nail bed including the nail matrix area and surrounding skin. Following that the eponychium was treated with spot size of 2mm, fluence of 255 j/cm² and 1.5 millisecond pulse duration. Two treatments were performed, spaced three months apart.

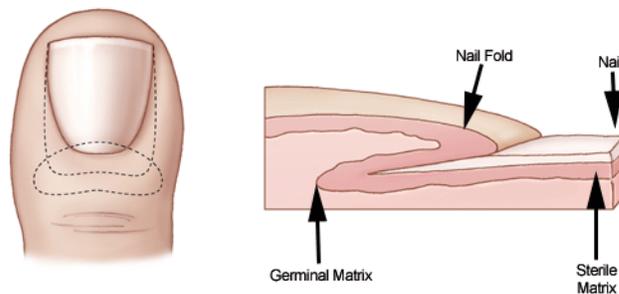


Figure 1. Anatomy of the Toe

Results

A new, healthy and clear toenail grew in within 6 months after the first treatment session. The patient reported a mild heating sensation and a tolerable treatment overall. No side effects were observed.



Conclusion

A 650 microsecond pulsed Nd:YAG 1064nm laser, operating in the range of 41 to 255 J/cm² in terms of fluence, can superheat and destroy onychomycosis while promoting the growth of a new, clear nail.