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ORIGINAL ARTICLE

Laser skin resurfacing with a novel portable erbium:YAG laser

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Abstract

Background and objective: The erbium:YAG laser is a popular modality for laser skin resurfacing (LSR). This study was performed to evaluate the safety and efficacy of a new portable Er:YAG laser in the treatment of photo-damaged skin. *Methods*: Nine patients with skin types I–IV were treated for rhytides, large pores, pigmented lesions, lentigines and photo-damage. Small facial areas such as the periorbital area, nose, cheeks, and upper lip were treated with one to six passes at 5–6 J/cm^2 with a new portable Er:YAG laser. Topical and local anesthesia was used. *Results*: All treated areas showed improvement and, depending upon the number of passes, re-epithelialization was complete within 2–7 days. The intense erythema resolved within 7 days and there was blending of treated and untreated areas within 2 weeks. *Conclusion*: The technique of applying a tailored number of 5–6 J/cm^2, 300 μs pulses of a new portable Er:YAG laser to small areas appears to be safe and effective. There was minimal discomfort and a high level of patient satisfaction after a relatively short recovery time.

Key words:

Introduction

The desire to look young and attractive is as old as human history. The advancement of laser technology has brought cosmetic procedure to the forefront and the number of cosmetic procedures is increasing every year. The introduction of CO_2 laser skin resurfacing (LSR) and its media coverage has brought laser terminology into common usage. LSR first with the CO_2 laser and then with the erbium:YAG laser gave dramatic improvement in signs of aging, but one of the undesirable effects is the slow and long recovery. In today's fast-moving world our patients demand quick treatments with no or minimal downtime. We as physicians and researchers developed new technologies and techniques which brought 'non-ablative' treatments to our patients. Despite advancements in non-ablative technology, we still believe that ablative LSR provides the most dramatic clinical improvement in wrinkles and photo-damaged skin (1). LSR essentially produces controlled thermal injury to the dermis. It is the process of wound healing with the production of new collagen in response to the injury that leads to the improvement of wrinkles (2).

In 1997, the Er:YAG laser received FDA approval and since then it has been a popular alternative modality to the CO_2 laser for LSR. The Er:YAG laser has been proven to have comparable efficacy with the CO_2 laser with fewer side effects and a faster recovery time (3). Furthermore, the Er:YAG laser with a wavelength of 2.94 μm has an absorption level in water 16 times greater than that of the CO_2 laser (4). This property makes it an ideal tool for tissue ablation, and hence improvement of facial rhytides. To minimize the recovery time and lower the risk of complications, many of us have developed 'superficial' ablative techniques, where only one pass with the CO_2 laser or a few passes with low fluence of the Er:YAG laser are used. This study attempted to evaluate the efficacy and safety of a new portable Er:YAG laser using relatively low fluence to treat signs of photo-damage.

Materials and methods

Nine female patients were recruited from an outpatient clinic for this study. All volunteers signed consent prior to participating in the study. Four

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patients had type I skin, four had type II and one had type III skin. The youngest patient was 26 years and the oldest was 63 years, with a mean age of 47 years. The patients had varying degrees of photo-damage and all patients were photographed prior to the treatments.

Er:YAG laser (FriendlyLight®, FriendlyLight Laser Corp., Tarrytown, NY, USA; Figure 1) treatments were performed in the periorbital, nose, cheek and upper lip areas. Anesthesia was achieved with either topical EMLA® cream (AstraZeneca LP, Wilmington, DE, USA) if the number of passes was three or fewer, or intradermal injection of 2% lidocaine with epinephrine if the number of passes was more than three. A fluence of 5–6 J/cm^2 was used with a 300 μs pulse, a spot size of 6 mm and a repetition rate of 1.5–2.0 Hz. Depending upon the degree of photo-damage, three to seven passes were used to treat the area. All personnel used safety goggles and patients' eyes were covered with wet gauze. All patients were asked to apply Aquaphor® ointment (Beiersdorf Inc., Wilton, CT, USA) to keep the treated area moist.

Patients returned for follow-up visits at 1 week, 2 weeks and 3 and 6 months after the treatment. Patients were photographed before, and 7 and 14 days after treatment. Patients completed a questionnaire and reported their level of satisfaction at 3 and/or 6 months after the treatment.

Results

The technique of applying a tailored number of 5–6 J/cm^2 300 μs pulses of this portable Er:YAG laser to small areas appears to be safe and effective. The re-epithelialization was complete in 2–7 days depending upon the number of passes. The average duration of intense erythema was 7 days. The blending of the treated and untreated areas in terms of skin color and texture was evident in less than 2 weeks. The patients reported mild to moderate discomfort and the level of satisfaction was reported to be high. (Figures 2–3.)

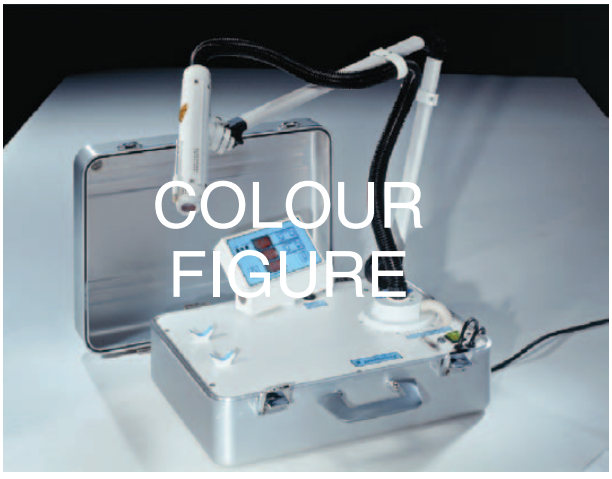

Figure 1. FriendlyLight® Er:YAG laser.

Discussion

The use of lasers for resurfacing skin has revolutionized the approach to treatment of wrinkles and other signs of photo-damage in the last decade The Er:YAG laser has not only been proven to be an

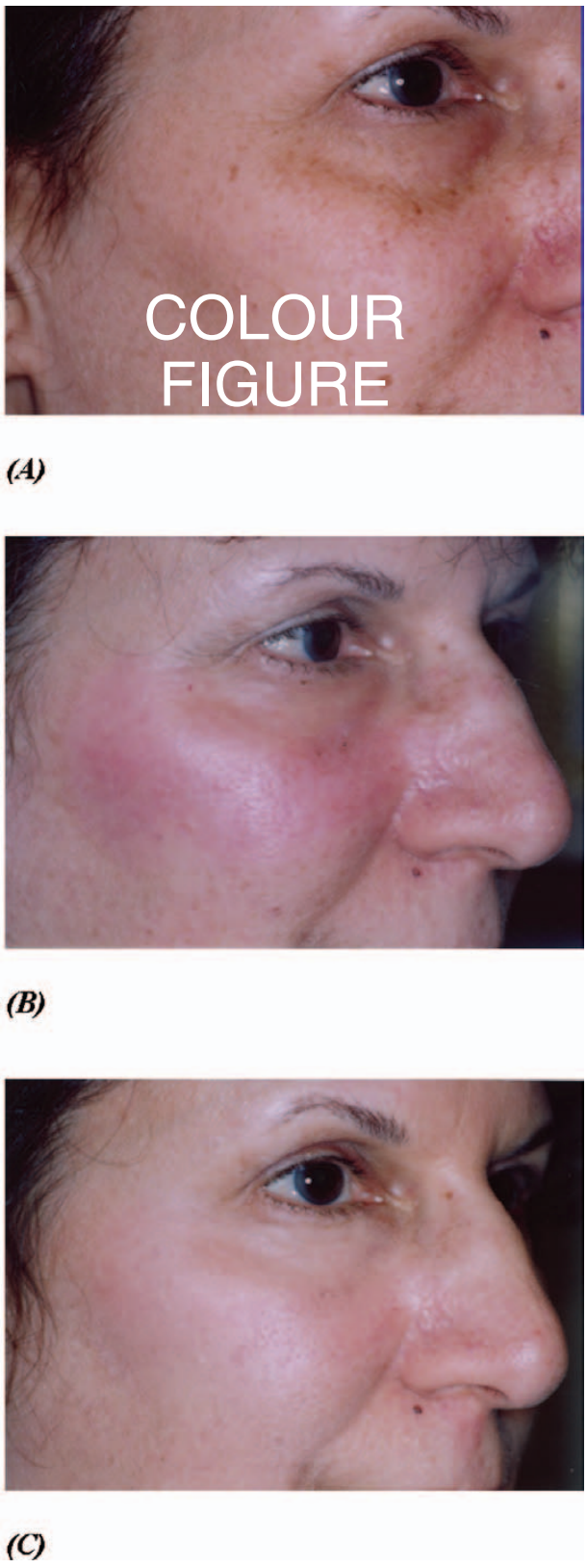

Figure 2. (A) Before, and (B) 7 days and (C) 14 days after treatment: five passes, 5 J/cm^2, 6 mm spot, 1.5 Hz.

Figure 3. (A) Before and (B) 9 days after treatment: four passes, 5 J/cm^2, 6 mm spot, 1.5 Hz.

efficacious modality for LSR (5) but also for the removal/ablation of various cutaneous lesions (6–10). Furthermore, compared with the CO_2 laser, the Er:YAG laser has a shorter downtime and a lesser risk of complications (3).

The Er:YAG laser has been proven to be a better option for darker skin types because of a lower risk of post-treatment pigmentation problems, a common complication seen with darker skin after ablative laser treatment (11–13).

A superficial skin ablation with an Er:YAG laser is a useful method for treating the effects of photoaging. As the Er:YAG laser is very effective in ablation of skin, it can be used for deep tissue ablation to remove dermal benign lesions and can also be used to treat superficial and deep rhytides. The operator can control the depth of ablation and use it to remove superficial lesions such as solar lentigines, actinic keratoses and deep class III rhytides in severely photo-damaged skin.

This study shows that a new portable devise, the FriendlyLight Er:YAG laser, can be used effectively to treat various aspects of photoaging. Many physicians are maintaining multiple practices and cannot afford to have multiple sets of laser devices at each location. As we move towards new laser technologies, we desire more effective devices with fewer or no side effects and devices that are financially affordable and are small enough in size not to take up too much space in the operating room. The device we tested is unique in its ability to be effective and still small and portable.

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