

Emerging Technologies in Facial
Plastic Surgery

FACIAL PLASTIC SURGERY CLINICS OF NORTH AMERICA



May 2007

Volume 15

Number 2


theclinics.com

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Erbium:YAG Laser Resurfacing Using a Novel Portable Device

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- Laser specifications
- Material and methods
- Results
- Discussion
- References

Laser resurfacing of facial rhytids has become a popular treatment option for many patients who have wrinkles, photodamage, and acne scarring. Laser wavelength, pulse duration, and newer techniques continue to shorten the healing phase associated with laser skin resurfacing while maintaining clinical efficacy [1–9]. Erbium:YAG laser resurfacing has emerged as one of the safer, more effective methods of facial rejuvenation compared with other modalities, such as carbon dioxide laser, with shorter recovery time and better treatment outcome [1].

The increasing popularity among physicians to use the Erbium:YAG laser for resurfacing has led to its widespread use; however, size and high initial and maintenance cost are among the problems with currently available laser devices. Additionally, because many cosmetic laser surgeons practice at more than one location, they are therefore faced with the challenge of using their laser devices at more than one office. The LightPod portable Erbium:YAG laser from Aerolase offers a new paradigm for more cost effective means of performing ablative resurfacing with reduced initial and maintenance cost and the ease of portability with significantly reduced size and weight (Fig. 1) [2].

The objective of this pilot study was to analyze the efficacy of The LightPod Erbium:YAG laser in different skin types for various indications.

Laser specifications

This study was performed using an Erbium:YAG laser, wavelength of 2940 nm, a pulse duration of 0.3 ms and a spot size of 2 and 6 mm with a repetition rate of 1.5 Hz (LightPod, Aerolase, Tarrytown, NY). Its collimated handpiece provides the safety of treating the skin without touching it. The fluence can be varied depending on the spot size (5 J/cm² with a 6-mm spot and up to 20 J/cm² with a 3-mm spot). This laser uses an internal air-cooling system instead of traditional water cooling systems that are used in larger Erbium:YAG lasers. It also uses a conventional 110 V electric supply. The entire system is housed in a briefcase-sized aluminum case weighing 20 lb for easy portability.

Material and methods

Six subjects (one male and five female) were recruited in the study. Four of the six subjects desired

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Fig. 1. The LightPod portable Erbium:YAG laser.

laser resurfacing for fine lines and dyspigmentation (with one being treated in conjunction with blepharoplasty), one for acne scars, and one for resurfacing combined with the removal of cutaneous lesions. Their skin types varied from I to IV with a mean age of 42 years. Duration of side effects,

such as erythema and bleeding, was evaluated and patient satisfaction was also considered. Complications such as postinflammatory hypopigmentation and hyperpigmentation, scar formation, and infection were also evaluated.

The laser was set up on a small table top or cart beside the reclining treatment chair. All conventional laser safety conditions were observed, including laser safety eyewear for the patient and surgical masks for the operator and any observers present. Smoke evacuator was used for plume evacuation. EMLA cream (lidocaine 2.5% and prilocaine 2.5%; Astra USA, Inc., Westborough, Massachusetts) was applied to the treatment site 2 hours before treatment. EMLA cream was wiped off and the eyes were covered with wet gauze underneath the protective eye wear. The full face of all study subjects was treated. A total of six passes were used in all subjects with varying fluences (5–20 J/cm²) at different spot sizes (6 or 3 mm). The laser pulses were applied next to each other, with approximately a 20% overlap.

All patients were evaluated immediately after the treatment for discomfort, erythema, swelling, and bleeding. At completion, the treated area was wiped with wet gauze and Aquaphor Ointment (Beiersdorf Inc, Wilton, Connecticut) was applied liberally. The postoperative care included vinegar soaks (half a teaspoon in a cup of cold



Fig. 2. (A) Before and (B) after resurfacing. (Courtesy of James Newman, MD.)

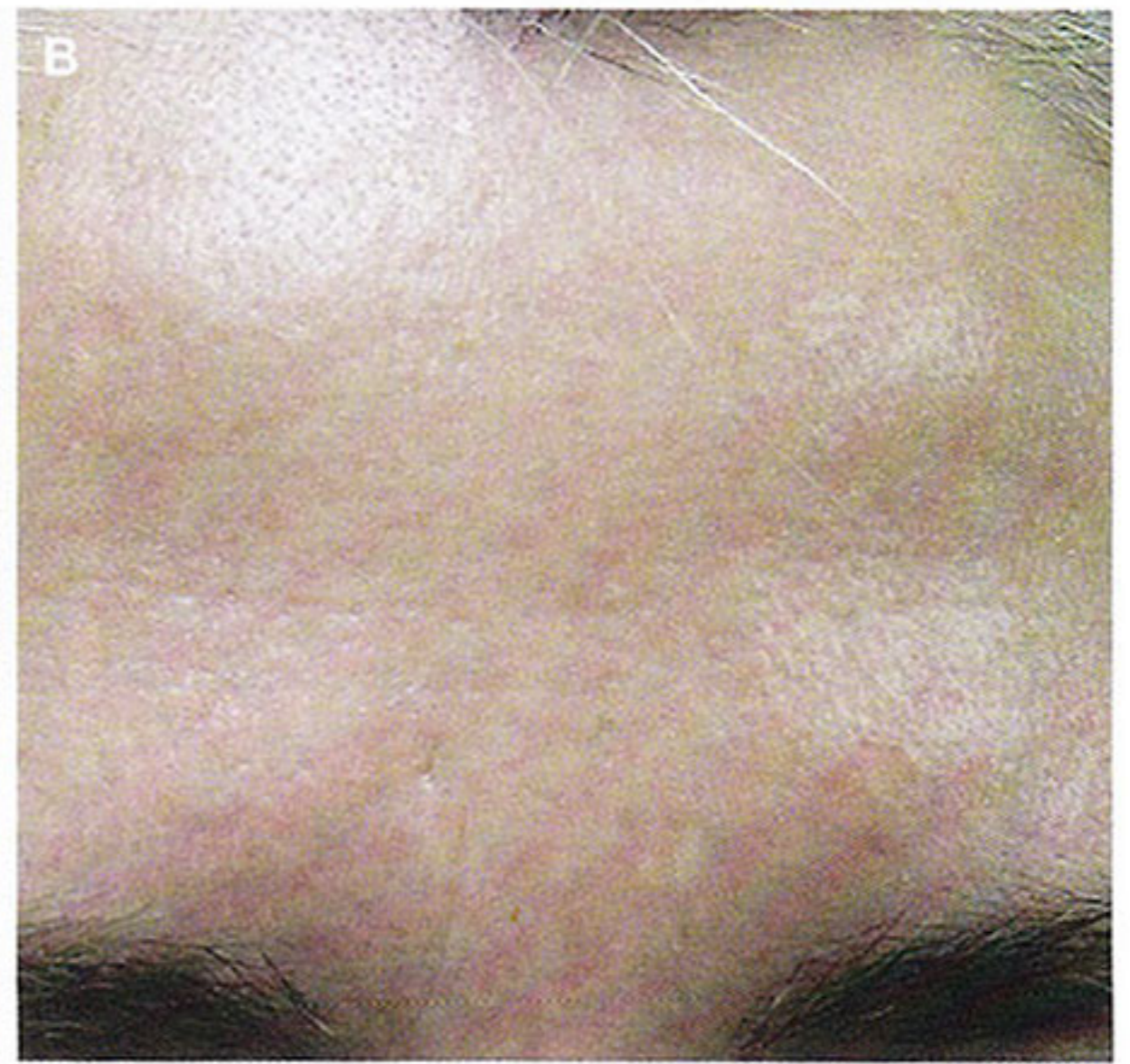


Fig. 3. (A) Before and (B) after resurfacing. (Courtesy of Taher Sobhy, MD.)

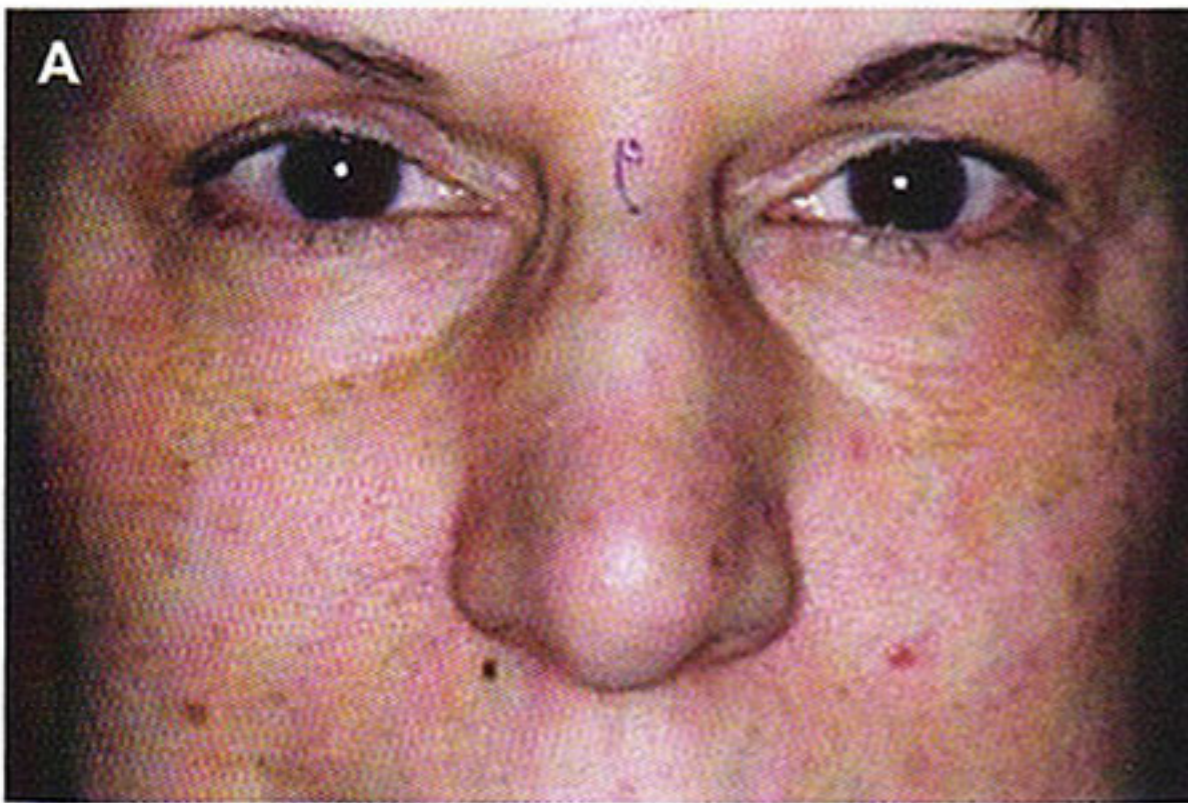


Fig. 4. (A) Before and (B) after resurfacing.



Fig. 5. (A) Before and (B) after resurfacing.



Fig. 6. (A) Before and (B) after resurfacing.

water) four times a day, washing with Cetaphil cleanser (Galderma, Fort Worth, Texas), and keeping the area moist with Aquaphor ointment. Written instructions were provided that the subject should remain indoors for 48 hours after the resurfacing. Subjects were then instructed to wear a complete sun block for 4 weeks. All subjects were followed up and photographed in the clinic at 1 to 5 days, 1 week, and 1 to 3 months after the resurfacing.

Results

All six subjects tolerated the procedure very well (Figs. 2–7). The grading and severity of discomfort, erythema, and edema were recorded on a scale of 1 to 5. A score of 1 represented none and 5 the most severe side effect. The average discomfort level was 2. Side effects such as erythema lasted an average of 6 days, at an average score of 1.2. No subject developed any complications such as hypo- or hyperpigmentation, infection, or scarring. On

long-term follow-up, no evidence was seen of ectropion or entropion in the subjects who underwent resurfacing in conjunction with blepharoplasty. Subject satisfaction was rated as high in all five subjects. Significant improvement in surface texture, dyschromia, mottled pigmentation, shallowness, fine lines and wrinkles, and skin porosity was seen after treatment at 1 and 3 months.

Discussion

Superficial treatment with this Erbium:YAG laser can produce an improvement in photodamaged skin that is less than that produced by full-face carbon dioxide laser resurfacing. It is a safer, more cost-effective ablative laser resurfacing. New gentle resurfacing and micropeel Erbium:YAG laser techniques are another contribution to contemporary clinical cosmetic medicine. These techniques yield far greater results in textural irregularities of aging and photodamaged skin than can be expected from milder nonablative laser or intense



Fig. 7. (A) Before and (B) after resurfacing.

pulsed light technologies that are now extremely common. The new Erbium:YAG (The LightPod) laser has unique practical features of compact size, low weight, and low cost but, in addition, its engineering and pulse design enables optimal skin cooling between pulses with minimal thermal damage, excellent patient comfort, and rapid healing.

A younger population with relatively milder photodamage can gain significant improvement in a shorter period. The authors suggest treatment with the pulsed Erbium:YAG laser for people who do not want to experience more painful and extensive procedures. These patients can undergo a quicker treatment without the need for injectable or general anesthesia. Patients can return to work within a few days after treatment. This treatment can also be used in addition to surgical procedures such as blepharoplasty with little or essentially no side effects (Fig. 6A, B), less pain, and shorter healing time, adding substantially to the overall cosmetic improvement to the eyes and periorbital region.

The improvement in skin tone, pigmentation, texture fine lines, and wrinkles with this superficial mode of thermal ablation is the result of epidermal reconstitution and remodeling of collagen that continues to take its effect over a period of months [10]. The application of EMLA cream before the laser resurfacing procedure helps to hydrate the skin [11]. As the 2940-nm wavelength is absorbed by water, this increase in water content in the skin may change the effective fluence and affect the light scattering inside the dermis; the effects of which are largely unknown. The extent of residual thermal damage after epidermal ablation might be responsible for the formation of a narrow band of fibrosis at

the upper dermis, which in turn can produce the skin-tightening effect.

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