
Real-life efficacy interstitial laser therapy treating laxity of the periorbital region

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ABSTRACT

Skin laxity in the periorbital region is a common problem that is usually treated surgically. This is not only invasive, but it also increases the risks for the patient and can result in scarring. Innovative therapies involving the use of the most recent generation of interstitial lasers allow for safe, minimally invasive, and effective intervention in patients suffering from blepharochalasis and periorbital bags. A 100% Made in Italy intra-tissue laser lifting technology, in particular, delivers energy to the subcutaneous tissue via laser fibers as small as 200/300 microns, ensuring a targeted release of energy and allowing the formation of new collagen while decreasing skin laxity. The purpose of this study is to assess the effect of an interstitial laser using optical microfibers on 5 patients aged 30 to 60 years. Following anesthesia (Lidocaine and Adrenaline), the treatment was performed using an endotissue laser with a wavelength of 1470 nm. The cumulative energy delivered by the laser by using 300-micron disposable fibers is equal to 200 Joules for each lid, with an infrared thermometer confirming an increase in skin temperature not exceeding 40°C. Over the next six months, patients experienced optimal results with no visible skin signs. In conclusion, we can state that intra-tissue laser lifting can be an effective strategy for the treatment of periorbital laxity, resulting in a decrease in dermal laxity and greater skin homogeneity while ensuring high precision, the absence of superficial incisions, rapid recovery, and optimal results.

Key words: interstitial laser therapy; skin laxity; periorbital region.

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Introduction

Skin laxity in the periorbital region is a common problem causing decreased self-confidence, dissatisfaction, and increased anxiety. Conventional therapy involves the use of surgery (blepharoplasty) which, however, can be invasive and leave behind scars.¹⁻³

The most advanced method to reduce this problem is the use of the interstitial fiber optic laser. Through a targeted release of subdermal energy, it allows the remodeling of the interstitial connective tissue, stimulating the formation of new collagen and increasing lymphatic drainage due to the reduction of the adipose component. A laser with a wavelength of 1470 nm is used which allows to precisely target water and adipose structures present in the tissues. The laser beam is conveyed in the subcutaneous tissue thanks to an optical fiber sizing from 200 to 600 microns. FTF fibers can be different in caliber and type of emission. Fibers of 200-300 micrometers are used to treat areas where the skin is thin or with a minimal layer of fatty tissue, while fibers of 400 or 600 micrometers are more suitable for areas of the body where the skin is thicker and with major fat.^{4,5}

The pulsed laser profile can be adapted to the needs of the patient by the clinician, setting the fluence and the emission times t-ON (emission) and t-OFF (tissue relaxation).

The interstitial laser allows us to obtain superior results compared to the use of radio frequencies, micro-focused ultrasound, and traction wires thanks to its reproducibility, simplicity in the procedure, and safety for the patient. Furthermore, it represents a non-invasive treatment, with little or no bleeding and consequently less post-operative bruising. Compared to procedures that involve the use of radio frequencies or external lasers, the optical fiber releases energy directly into the sub-dermal layers, leaving the superficial layers of the epidermis unchanged.⁶

Nowadays this technique is increasingly widespread for the treatment of different parts of the face and body, providing excellent results in the following 6 months and ensuring greater skin tension in a simple, painless, and safe way for the patient.²

Materials and Methods

The study was carried out in an outpatient setting considering 5 subjects aged between 30 and 60 years with periorbital skin laxity and fat bags, with a follow-up of 1 to 3 months. The treatment involves the use of an endotissue laser equipped with 300-micron FTF (fiber-to-fiber) fibers with radial emission and connected to a diode laser with a wavelength of 1470 nm. Once the fiber is inserted in the correct plane, *i.e.* the middle hypodermis and surface anterior to the orbicularis muscle, it is possible to identify the position of the fiber thanks to a red

LED pointer, visible through the patient's skin. The fiber is moved forward and backward, forming micro tunnels oriented according to anti-gravity vectors. The fiber does not directly penetrate the interseptal fat bags, but smoothes the muscle-adipose surface above them, thus, by increasing the tension of the dermal cutis retinacula, skin redundancy is reduced and a more homogeneous appearance of the skin is obtained. During the procedure, which lasts approximately 30 minutes, the skin reaches a maximum temperature of 40°C, exploiting a cumulative energy of 200 Joules per side. The energy delivered for each laser treatment is established following the parameters accepted by the international scientific community regarding laser modulation for skin and soft tissues.⁷

Before applying the laser, anesthesia was prepared with Lidocaine 2% + Adrenaline 1:100,000. The sterile operating field is prepared with Betadine solution and TNT drapes. After the procedure, patients can resume their daily lives, without visible skin signs but with a possibility of erythema or edema that is reabsorbed in a few hours or a few days (Figures 1, 2 and 3).^{8,9}

Discussion

The interstitial laser determines the remodeling of collagen, neocollagenesis, and photobiomodulation of the connective tissue resulting in a tightening effect of the overlying skin. The result is noticeable immediately but improves considerably over time (about 3 months).

If adipose tissue is also present in the treatment area, by changing the laser settings and the depth of action it is possible to obtain an emulsification of the adipose tissue itself while always maintaining the contraction on the skin tissue.^{8,9}

The goal of the treatment is to obtain an improvement and greater homogeneity of the superficial tissues. The operator should notice a reduction in the resistance to the passage of the optical fiber and a change in the surface morphology of the tissue (Figure 4).

The first endpoint is determined by the morphological surface, visual and tactile changes, which allow us to evaluate the quality of the treatment.

The second clinical endpoint, during the procedure, is the surface temperature, which does not exceed 40°C (measured with an infrared thermometer), this determines a lower downtime since there is coagulation of the collagen and not its vaporization. The increase in skin temperature causes temporary erythema.¹⁰

The third clinical endpoint is the amount of Joules to be delivered. It is important to dispense similar volumes between the two emilates to maintain the best possible symmetry, where instead of differences being noted, it is also necessary to make use of the visual and tactile endpoint to decide in which area to dispense greater quantities of Joules (Figure 5).



Figure 1. Immediate result of interstitial laser (left), closed lower blepharoplasty (right).



Figure 2. Result 30 days after treatment (left), result after 3 months (right).



Figure 3. Result 2 months after the treatment.



Figure 4. Detail of lower eyelid treatment (left), 3 months after treatment (right).



Figure 5. Residual erythema in the upper eyelid in the immediate post-treatment.

Conclusions

In recent years, laser devices have become increasingly important in daily clinical and surgical practice, as they make it possible to satisfy a large number of therapeutic indications in a simple, reproducible, and safe way.

The interstitial laser is a revolution in minimally invasive treatments to lift and shape body tissues. With its potential, this procedure responds to current requests for soft rejuvenation of skin tissues and reduction of unwanted fat deposits, with minimum downtime and maximum safety for the patient.

In conclusion, the introduction of the intra-tissue laser in daily clinical practice is an excellent ally for the doctor, allowing him to approach problems up to now exclusively of surgery.

Ethics approval and consent to participate: no ethical committee approval was required for this case report by the Department, because this article does not contain any studies with human participants or animals. Informed consent was obtained from the patient included in this study.

Patient consent for publication: the patients gave their written consent to use their personal data for the publication of this case report and any accompanying images.

Availability of data and materials: all data underlying the findings are fully available.

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