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Fotona VectorLift™ Technique for Eyebrow Tail Elevation and Upper Eyelid Rejuvenation with hyperstacking of Smooth Mode pulses

Adrian Gaspar
Espacio Gaspar Clinic, Mendoza, Argentina;

INTRODUCTION

a) Hyperstacking of SMOOTH Mode Er:YAG pulses – a balanced approach for optimal results

Due to the skin's natural aging process, many body areas can benefit from tightening protocols that assist in reversing the effects of aging such as progressive tissue laxity. An ideal treatment should be minimally aggressive to the treated area and provide immediate changes that confirm a positive tissue response and ensure symmetric improvement with long-lasting effects. A key factor in this regard is finding the optimal balance between immediate tissue tightening (superficial contraction), depth of new collagen formation (long-term rejuvenation) and the use of fluences that are comfortable for the patient while creating no unwanted side effects.

A better understanding of how to optimize rejuvenating laser treatments can be seen from immunohistochemical analysis of multiple tissue samples treated under different SMOOTH mode Er:YAG pulse modalities. Fotona's exclusive SMOOTH mode train of pulses has a proven record as an effective tool that transforms Er:YAG's typically shallow penetration depth into a powerful solution for heating and stimulating the renewal of deeper tissue structures. The versatile software on Fotona's laser system also allows for the performance of tests on different variations of SMOOTH mode pulses, offering the ability to adjust pulse duration, amount of stacking and fluence.

We extracted tissue samples from patients and analyzed them with immunohistochemistry (Procollagen Type I C-Peptide (PIP) Monoclonal Antibodies), allowing for the determination of the depth and density of procollagen I formation, a key indicator of the quality of the laser rejuvenation process.

We can classify the results of our findings into three main groups of protocols:

1.) Very few stacks (2 stacks) with high fluence levels targeted to maximizing tissue contraction (2.1 J/cm^2 in each SMOOTH pulse, total accumulated: 4.2 J/cm^2). Although effective in reaching an immediate superficial tightening effect and performing it in a very short treatment time, this option has limitations in heat penetration, providing only shallow development of new collagen (below 500 μ), which in turn reduces the long-term effectiveness of the treatment and provides poorer restructuring of dermal structures and overall skin quality. Also, the use of these higher fluences can restrict the application of these parameters on patients with high sensitivity and potentially result in more unwanted side effects due to its aggressive nature.

2.) Ultra-high hyperstacking (20 stacks) with very low fluence levels (0.6 - 0.7 J/cm^2 in each SMOOTH pulse, total accumulated: 12.0 - 14.0 J/cm^2).

The use of slow, incremental accumulation of heat provides a very comfortable experience for patients, but even at high repetition rates, the production of such continuous pulses is time consuming. During the extended emission time required to complete every hyperstacked spot, the body is continuously generating blood flow at comparatively low temperatures, which acts as a cooling mechanism, therefore preventing deeper penetration of significant heat increments. A significant percentage of fibroblasts (>50%) containing procollagen I formation was identified at depths of up to 1000 μ.

3.) Mid-level hyperstacks (10 stacks) with low level fluences (1 J/cm^2 in each SMOOTH pulse, total accumulated: 10.0 J/cm^2)

By shortening the total time of emission per spot (fewer stacks) and using slightly higher fluences than the previous group, we were able to register the deepest presence (fibroblasts were identified as procollagen I positive in depths of up to 3100 μ, reaching the deeper dermis) and the highest density of procollagen formation (50% of procollagen formation at 1225 μ). As an added feature, the total treatment time is half of what is required with ultra-high hyperstacking.

This depth of penetration is particularly desirable for facial treatments in order to tackle shallow and deep dermal collagen formation while preserving subcutaneous fat, which is vital for facial integrity. Using low fluences and mid-level hyperstacking also provides a

comfortable experience for the patient by providing a gradual heat increase, which avoids the shock that can be induced by high-powered single pulses.

Based on our findings we applied these last parameters to our patient base.

b) Maximizing the total treatment surface

As with most of Fotona's rejuvenation protocols, the ideal combination of pulses needs to be paired with skilled anatomical placement of the laser beam to obtain consistent and highly rated patient results. Just like when intraoral treatments provided a new dimension for tissue rejuvenation, this current protocol offers the opportunity to take advantage of extending the total area of treatment by applying it over the scalp. By expanding the total treatment area to a larger surface, a higher number of traction points is created, therefore providing an increased overall tightening effect.

Since the Er:YAG's main chromophore is water rather than pigments, it offers a distinctive advantage over other laser wavelengths and energy-based devices that have an affinity for the pigments that are present in hairs, thereby inhibiting their use in this area.

It is also important to point out that the scalp represents a very powerful anchor for traction and tightening of the frontal and temporal tissue, since the underlying superficial musculoaponeurotic system (SMAS) is tightly attached to deep structures, and for this reason has been routinely used very effectively by plastic surgeons for the attachment of traction sutures as well as in aesthetic medicine when placing threads for this same type of treatment.

LASER TREATMENT PROTOCOL

c) Anesthesia and treatment area marking

This protocol, which is part of the Fotona VectorLift™ series, targets the elevation of the tail of the eyebrows and tightening of the upper eyelids to procure an enhancement of peri-ocular aesthetics for patients who may benefit from the rejuvenation and elevation of these structures.

No special skin preparation is required. The procedure is performed under topical anesthesia (lidocaine 15% + benzocaine 15% + procaine 15%), which is applied to the face in the different regions explained below, 20 minutes prior to treatment, and covered with a thin film for enhanced penetration. Anesthetic cream is not required in the scalp area.

Before the laser procedure is started, markings with white pencil are performed to assist the laser operator with the treatment plan. Lines are drawn as in the example below, extending a vertical line that starts at the hair line and ends above the eyebrow using the mid pupillary center as a reference. The line follows contouring above the eyebrow until the horizontal line of the upper part of the ear is met, as drawn in the example below (Fig. 1).

Figure. 1: Treatment line.

Then, individual spots are marked 6 mm apart on the hair line of the parietal area, which will serve as guiding points to manually open hair channels to treat the scalp (Fig. 2).

Figure 2: Hairline guiding points.

The ***first step,*** applying the parameters described in the table below (option B – stamping), uses a low-fluence hyperstacking (endpoint erythema or pain) of SMOOTH mode pulses to generate tension vectors on

the forehead and parietal area that has been previously marked. Note that it is desirable that the last shot in the row superimposes one full spot over the hair itself. As with any scalp treatment, the only precaution that must be taken is that the hair is dry when applying the Er:YAG laser to avoid any hair damage.

The main effect of this step is to create a strong tightening response that will elevate the eyebrow tail and tissue above the eyelid, as well as reduce periocular wrinkles. Regarding the application technique, while one hand operates the laser handpiece, the other is placed at the hair line, producing continuous traction and elevation of the skin towards the scalp while the laser is being emitted. This motion will stretch the retinacula cutis fibers so that all the connective structures will tighten and facilitate heat penetration. The laser traction vectors are always emitted in individual straight lines (as seen in Fig. 3), starting each line from the eyebrow and finishing over the hair line, with the next contiguous vector repeating the same motion until the whole area is covered. It is ideal to perform three full passes with the same technique if the skin allows.

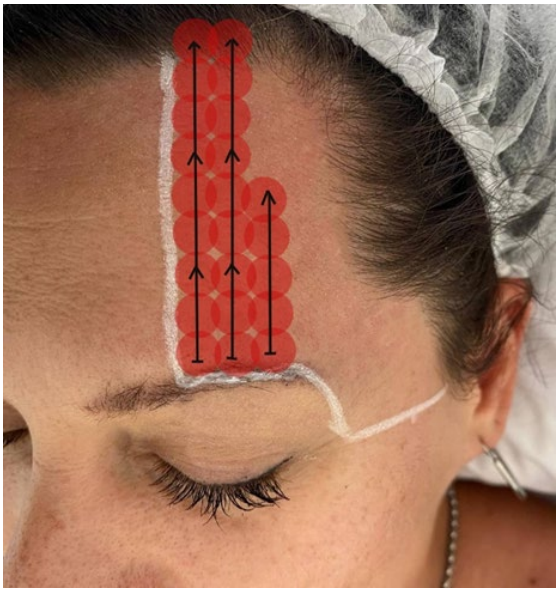

Figure 3: Laser traction vectors.

Alternatively, option A with a brushing technique can be applied to the same region using the parameters described in the chart below. In this case it is also important to use the free hand to elevate the skin in the direction of the tightening vector while the laser is applied.

The second step is centered on the application of hyperstacked pulses on the scalp in order to increase the traction vector total surface. As mentioned before, the only precaution is to ensure that the hair is dry during the laser application.

Starting at the location where white dot markings had been placed (Fig. 2), hair channels are created by manually separating hairs, creating a 4 cm long channel that runs up the scalp. The laser operator can hold the hair separation with one hand while applying the laser with the other as seen in Fig 4. Spots are separated by minimum or no overlapping to avoid overheating.

Figure 4: The laser operator can hold the hair separation with one hand while applying the laser with the other

Each row is treated with one pass using the parameters mentioned above. When all rows are completed, a new pass is made over the area, and so on, until a total of three passes is performed.

Fluences of 2 to 2.5 J/cm² are normally well tolerated by patients. The higher the fluence applied, the better the results that can be expected. In cases when patients cannot tolerate this range and the fluence needs to be lowered, it is advisable to increase the number of passes to compensate for the low fluence applied.

The third step, with slightly lower fluence parameters detailed in the table above, addresses a more sensitive region – the upper eye lid. For safety reasons, all pulses that are performed over the eyelid should stay 4-5 mm away from the eyelash margin as shown in Fig. 5. As an additional precaution, corneal shields can be used to provide further protection.

d) Parameters

	Step 1 Forehead	Step 2 Scalp	Step 3 Upper eyelid
Laser Systems	**SP Dynamis – XS Dynamis – SP Spectro – TimeWalker**		
Laser source	Er:YAG	Er:YAG	Er:YAG
Handpiece	PS03X	PS03X	PS03X
Pulse Mode	SMOOTH	SMOOTH	SMOOTH
Fluence	Opt A: 6.25 J/cm² / Opt B: 2.0–2.5 J/cm²	2.5 - 3.0 J/cm²	1,7 J/cm²
Frequency	Opt A: 3.3 Hz / Opt B: 1.6 Hz	1.6 Hz	1.6 Hz
Spotsize	7 mm	7 mm	5 mm
Technique	Opt A: Brushing 500-700 pulses/area / Opt B: Stamping 2.0 – 2.5 J/cm²	Stamping	Stamping
Number of stacks	Opt A: - / Opt B: 10	10	6-10
Number of Passes	Opt A: 1 / Opt B: 1 - 3	3	3
Tx Interval	4 sessions, 1 every 3 weeks		
Anesthesia	Topical (not in scalp)		
Cooling	No		

e) Post-op management

This protocol is remarkably non-aggressive and allows patients to return immediately to their normal routines. We routinely follow the treatment with a topical hydration gel containing hyaluronic acid and vitamin C, administered 3 times a day for three days. Also, sun protection is highly recommended for a week. Hydration gel can also be applied at night with a combination of hyaluronic acid and Retinol.

In the rare cases of patients that present a marked erythema, we prescribe hydrocortisone 1% applied every 12 hours for 3 days.

f) Contraindications

Besides the normal laser treatment exclusion criteria, we carefully observe for any lesions, infections and screen for any herpes zoster background in order to adopt a prophylactic, preventive approach.

g) Protocol adjustments

Even while using identical parameters, not all patients will respond equally on both sides of their face. So to provide the best possible outcome, we carefully adjust our treatment in order to achieve symmetry. Generally, this is accomplished once all areas are fully treated by adding additional tension vectors on the forehead to the less elevated side where the lowest eyebrow tail is found.

For those patients who would prefer or benefit more aesthetically from a fuller eyebrow elevation, the protocol can be adjusted by simply displacing the white vertical marking towards the center of the forehead, which would produce a full elevation of the eyebrow.

For cases of extreme palpebral laxity, for which a surgical blepharoplasty would normally be recommended, the practitioner can opt to take a more aggressive approach and use the technique of non-surgical blepharoplasty described by Dr. Valdivia Sing in his 2020 LA&HA presentation[1] using a contact handpiece to achieve maximum tissue contraction.

h) Treatment combinations

Considering that this is a treatment focused on the upper third of the face, it can be very successfully combined with mid and lower third area protocols, providing even more impactful results. Intraoral treatments for non-invasive tightening of the nasolabial folds[2,3], lip enhancement (LipLase®)[4] and ultra-light Erbium facial peels[5] are great examples of safe and effective alternatives.

Plasma rich platelet (PRP) additions can also work in synchrony to enhance collagen production and stimulate a complete facial rejuvenation.

i) Case examples

We provide some cases below that illustrate our regular outcome for this type of procedure.

Fig. 6. Case 1. Right side only treated – 1st session

Fig. 7. Case 2. Right side only treated – 1st session

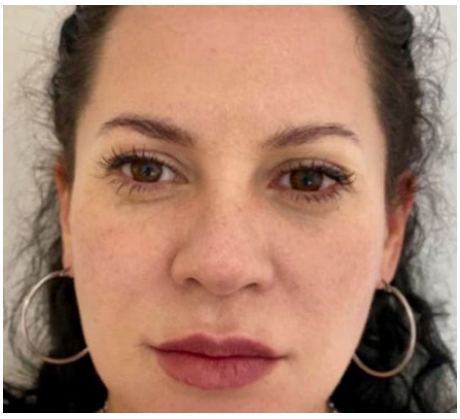

Fig. 8. Case 3. Before

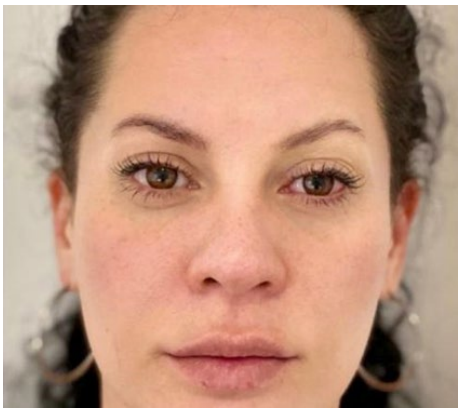

Fig. 9. Case 3. After 2 Tx

Fig. 10. Case 4. Right side only treated – 1st session

Fig. 11. Case 5. Combined VectorLift™ + 4D before and immediately after 1st session

Fig. 12. Case 6. Combined VectorLift™ + 4D + PRP before and after 3 sessions

REFERENCES

1. Valdivia R. Non-surgical Blepharoplasty with Er:YAG Contact Handpiece. https://www.laserandhealthacademy.com/en/library/6405/roberto-valdivia-sing-non-surgical-blepharoplasty-with-er-yag-contact-handpiece/
2. Gaspar G, Gasti G. Tightening of facial skin using intraoral 2940 nm Er:YAG SMOOTH mode, Journ Laser Health Acad 2013;
3. Ebrahim H, Gharib K. Correction of nasolabial folds wrinkle using intraoral non-ablative Er:YAG laser. Journ of Cosmet and Laser Ther 2018;
4. Gaon N, Binfa F. The effect of intraoral 2,940 nm nonablative Erbium:YAG laser on the rejuvenation of the upper lip: a pilot study. Surg Cosmet Dermatol 2017;9(1):56-8.
5. Shanina N, et. al. Histological and immunohistochemical changes in facial skin treated with combined ablative and non-ablative laser therapy. Journ Cosmet Dermatol 2020;