

Advancing non-invasive facial rejuvenation with Fotona4D HoneyComb+ combining Er:YAG and Nd:YAG protocol: A clinical case series

Abstract

This prospective clinical case series evaluated submental volumetric changes, patient satisfaction, and physician-assessed aesthetic outcomes following the Fotona4D HoneyComb+ protocol for non-invasive facial rejuvenation. Twelve women with mild-to-moderate facial aging (mean age 48.9 ± 6.1 years) underwent three treatment sessions approximately six weeks apart. The five-step protocol combined Er:YAG (2940 nm) and Nd:YAG (1064 nm) laser treatments and incorporated HoneyComb Lift. Standardized three-dimensional imaging was performed at baseline and three months after the final session to quantify submental soft-tissue volume changes. Patient satisfaction and physician-assessed aesthetic improvement were evaluated using 0–10 visual analog scales one to three months after the final session, and adverse events were recorded. All patients completed treatment and follow-up. Submental volume reduction was observed in all patients, with a mean reduction of 8.43 ± 3.31 mL (range 3.09–14.36 mL; $p < 0.001$). Mean patient satisfaction and physician assessment scores were 8.08 ± 1.44 and 7.92 ± 1.08 , respectively. Clinical observations included improvements in skin tightening, texture, quality, and facial contour definition. No serious adverse events were reported; mild transient erythema and oedema resolved spontaneously without intervention. Fotona4D HoneyComb+ was associated with reduced submental volume and high patient satisfaction in this cohort. The small sample, uncontrolled design, and limited follow-up restrict interpretation. Larger controlled studies with longer follow-up are needed to confirm clinical benefits and durability.

Keywords: honeycomb lift, skin elasticity, non-invasive facial rejuvenation, nasolabial folds.

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Tatjana Linova

Dermatologist and Immunologist, LINOVE Clinic, Vienības gatve 109, Rīga, Latvia

Correspondence: Tatjana Linova, MD, Riga Linove Private Practice, Latvia, Tel +371 28623244

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Introduction

Facial aging is a multifactorial process characterized by progressive collagen degradation, dermal thinning, elastosis, loss of structural support, and redistribution of facial volume. In addition to intrinsic aging, extrinsic factors such as ultraviolet exposure and environmental stress contribute to textural irregularities, laxity, and pigmentations.¹ While surgical rhytidectomy remains the gold standard for advanced facial laxity, an increasing proportion of patients seek non-invasive or minimally invasive alternatives that offer meaningful aesthetic improvement with minimal downtime and reduced procedural risk.²

Laser-based rejuvenation techniques have evolved significantly over the past two decades. The synergistic use of Er:YAG (2940 nm) and Nd:YAG (1064 nm) wavelengths that enables controlled thermal interaction at multiple tissue depths enabled the Fotona 4D® protocol establishment, that has shown to be very effective in facial skin rejuvenation.³

Fotona 4D® protocol integrates 4 steps. First step is a non-ablative intraoral Er:YAG tightening (SmoothLiftin™) treatment, that is targeting collagen remodelling in the area of nasolabial folds, resulting in skin tightness and improved skin elasticity leading to wrinkles reduction. Second step uses three-dimensional fractional-like Nd:YAG pulse (FRAC3®) that selectively induces non-ablative fractional dermal micro-injuries to stimulate neocollagenesis and imperfections. Third step enables deep bulk heating using long pulse Nd:YAG (PIANO™) mode for overall synergistic tightening effect. Following by a light superficial Er:YAG peel (SupErFicial™) that enhances epidermal refinement and surface quality, which additionally improves the appearance of the skin and reduces imperfections.^{3–5}

With this, the overall effects of the Fotona 4D® treatment protocol aim to reduce wrinkles, improve the skin texture and volume, resulting in more youthful, naturally refreshed appearance.

The Fotona4D HoneyComb+ protocol expands upon this framework by incorporating additional HoneyComb® Lift step. HoneyComb® Lift utilizes patterned SMOOTH® Er:YAG laser pulses delivered through HC6 optics to generate a dual thermal effect consisting of superficial intense heat-shock biomodulation (i-HBM) and deeper dermal heating. This controlled thermal stimulation has been shown to activate fibroblast activity, promote collagen remodelling, and initiate regenerative processes within the treated tissue.^{6,7} The honeycomb-patterned beam enhances transverse heat dissipation, enabling stronger localized thermal stimulation and increased i-HBM efficiency compared to conventional full-spot delivery, while maintaining tissue temperatures within safe and comfortable limits.⁶ These mechanisms provide a more effective regenerative response than bulk heating approaches and are associated with improvements in skin laxity, texture, and overall skin quality observed in clinical practice.^{6,8}

This clinical case series aimed to evaluate patient-reported satisfaction and physician-assessed clinical outcomes following a standardized Fotona4D HoneyComb+ protocol, focusing on skin quality, tightening, and facial volumization.

Materials and methods

Participants

This prospective clinical case series included 12 female patients (mean age 48.9 ± 6.1 years) presenting mild-to-moderate signs

of facial aging. Exclusion criteria comprised of pregnancy, active infection, recent isotretinoin use, or recent facial laser treatment. A signed informed consent was obtained, and the procedure was performed according to the Declaration of Helsinki.

Treatment protocol

Each participant underwent three sessions of the following Fotona4D HoneyComb+ laser treatment protocol spaced

approximately 6 weeks apart. The treatment was done using the SP Dynamis (Fotona, Slovenia) laser system without any anesthesia. Air cooling was applied in steps 3 and step 5 of the Fotona4D HoneyComb+ protocol, using the parameters outlined in the Table 1 below.

Table 1 Fotona4D HoneyComb+ treatment parameter

	Step 1: SmoothLiftin™	Step 2: HoneyComb® Lift	Step 3: FRAC3®	Step 4: PIANO®	Step 5: SupErficial™
Wavelength	2940 nm	2940 nm	1064 nm	1064 nm	2940 nm
Handpiece	PS03X – SmoothTouch LA Adapter	T-Runner – HC ⁶ optics	R33-T	L-Runner	PS03X
Pulse Modality	SMOOTH®	V-SMOOTH	FRAC3®	PIANOTM	MSP
Pulse Duration	250 ms	625 ms	1.6 ms	5 s	0.1 ms
Fluence	7.0 J/cm ²	10.4 J/cm ²	25–35 J/cm ²	1.2 W/cm ²	1–4 J/cm ²
Frequency	1.6 Hz	-	3 Hz	-	30 Hz
No. of Pulses/stacks	3–6 stacks	6 stacks	2000 pulses	Up to 42°C	1 pass
Spot size	7 mm	-	4 mm	9 mm	5 mm
Cooling	-	-	Yes	-	Yes

Evaluation protocol

Facial imaging for visualization of skin surface and measurement of the volume changes was done using LifeViz® (QuantifiCare, n.d.) at baseline, and 3 months after the last treatment session. Standardized image acquisition was ensured using fixed camera positioning, controlled lighting conditions, and patient alignment according to the guidelines. Acquired images were processed to generate 3D surface models.

For volumetric analysis, the region of interest (ROI) was standardized using anatomical reference points defined by the bilateral jawline angle points, bilateral pre-jowl sulcus points, the menton, and the thyroid cartilage prominence on the midline. This framework defined the submental region within which volumetric changes were calculated. Vector analysis assessing the surface displacement between timepoints, where vectors represent both the direction and magnitude of tissue movement was generated for visual representation.

Patient self-reported satisfaction with overall aesthetic improvement, as well as physician evaluations of skin tightening, texture, quality, and volumetric changes, were assessed using a Visual Analog Scale (VAS) ranging from 0 to 10. A score of 0 indicated no improvement, 5 indicated moderate improvement, and 10 indicated very significant improvement. Assessments were completed 1–3 months after the final treatment session.

Adverse events were recorded.

Results

All 12 patients completed the treatment protocol and follow-up evaluations.

Objective volumetric outcomes

All patients demonstrated a reduction in submental soft-tissue volume following treatment as shown in Figure 1 below. The mean

volumetric reduction was 8.43 mL ($\pm$ 3.31 mL), with a range from 3.09 mL to 14.36 mL. The median reduction was 8.74 mL, indicating a consistent treatment effect across the cohort. A one-sample t-test was performed to assess whether the mean soft-tissue reduction differed from zero. The mean reduction was 8.43 ± 3.31 mL and was significantly greater than zero ($t(11) = 8.83$, $p < 0.001$).

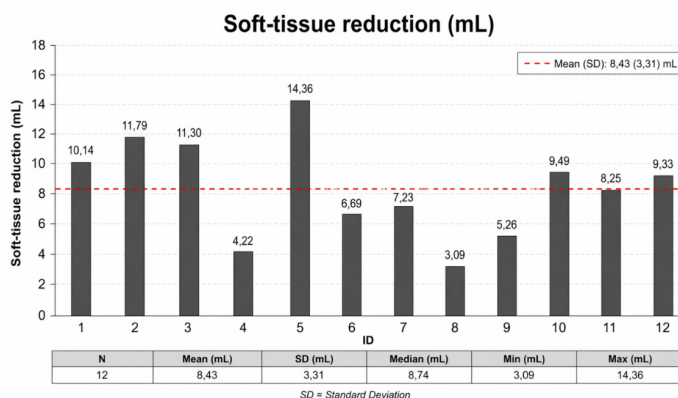


Figure 1 Soft tissue volume reduction

Visual Analog scale outcomes

Patient-reported satisfaction with the overall aesthetic improvement, assessed using VAS, showed high levels of perceived aesthetic improvement. The mean score was 8.08 ± 1.44 , with a median of 8.5, reflecting overall strong satisfaction with treatment outcomes. Independent physician evaluation using VAS yielded a mean score of 7.92 ± 1.08 (median 8.0). Clinical improvements were consistently observed in midface and lower-face tightening, skin texture refinement, improved skin quality and tone and enhanced contour definition. Individual scores are shown on Figure 2.

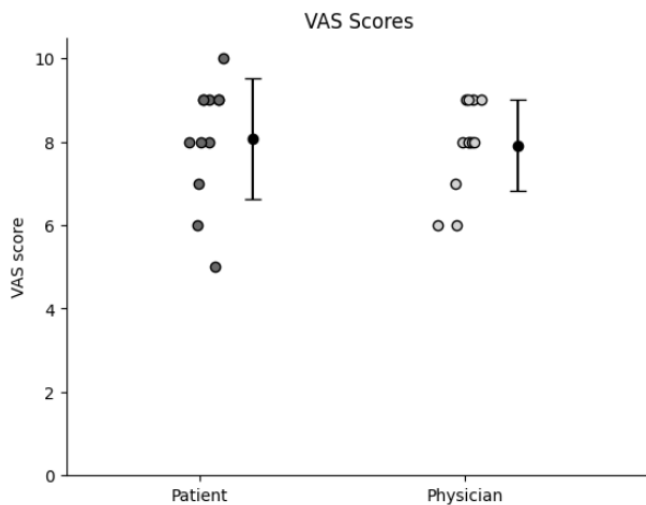


Figure 2 VAS Score showing VAS Patients self-assessment scores with the satisfaction of the overall aesthetic improvement on the left, and physician VAS scores of the physician assessment of tightening, skin texture and skin quality, and volumetric changes.

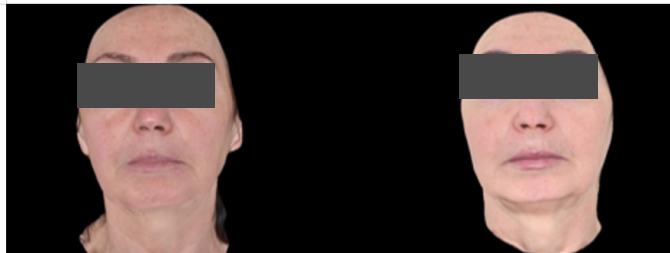


Figure 3 Improvement of the skin texture, skin tightness, imperfections and pigmentations can be seen on image on the right, taken 3 months after the last treatment session. Image on the left taken before the treatment.

Standardized imaging done with LifeViz® system shows visible improvements in skin laxity and firmness, fine lines and wrinkles, pigmentation irregularities, overall skin texture and radiance consistently in the patients after the Fotona4D HoneyComb+ treatments as seen on Figure 3 and Figure 4 below.



Figure 4 Image on the left taken before the treatment, image on the right was taken 3 months after the last treatment session, showing improvement of the skin texture, wrinkles, skin tightness, imperfections, pigmentations and redness.

The treatment was well tolerated. No serious adverse events were reported. Mild transient erythema and oedema were observed in several patients, resolving spontaneously without intervention.

Discussion

This clinical case series demonstrates that the Fotona4D HoneyComb+ protocol provides meaningful improvements in facial

rejuvenation and skin tightness outcomes, combining both subjective satisfaction of the patients, physician assessment and objective volumetric changes. The results support the idea, that combination of different laser stimulation approaches, known as Fotona4D protocol enhanced by honeycomb-patterned SMOOTH® technology, can effectively address key components of facial aging.

As facial aging involves structural, dermal, and epidermal changes, including collagen degradation, elastosis, and volume redistribution,¹ the results of the Fotona4D HoneyComb+ protocol presented in this clinical case series show, that it does target these processes through multi-depth thermal stimulation and improves the signs of aging. The integration of Er:YAG and Nd:YAG wavelengths in the Fotona4D protocol is showing great results in reduction of age spots, wrinkles, pores size, improvement of skin texture, skin elasticity and tightening of the skin.³⁻⁵ The addition of HoneyComb® Lift further enhances this framework by delivering patterned SMOOTH® pulses that induce i-HBM⁶⁻⁸ and further facilitate the skin tightening, countering effect and reduce the submandibular soft-tissue volume.

The observed reduction in submandibular volume is particularly notable. While non-invasive treatments are often limited to surface-level improvements, the measured changes suggest effective deep tissue tightening, possible fat compartment remodelling or redistribution and improved jawline definition, a key aesthetic concern in aging patients. These findings align with previous studies demonstrating that combined Er:YAG and Nd:YAG protocols can induce both dermal remodelling and visible lifting effects.^{3-5,8} The majority of patients (7 out of 12) achieved reductions between 6 mL and 11 mL, representing a clinically meaningful improvement. A subset of patients exhibited higher responses, exceeding 11 mL, with the maximum reduction reaching 14.36 mL. Figure 5 shows the patient with 11.3 mL volume reduction.

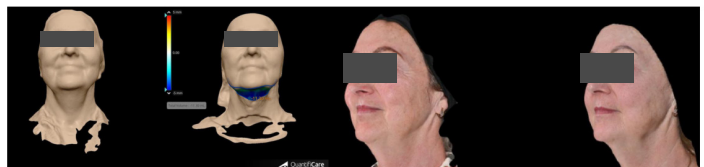


Figure 5 Volume reduction measurement.

High patient satisfaction scores (mean >8) correlate well with physician assessments (mean >7.9), indicating that the improvements were both clinically significant and perceptible to patients. In both VAS scores, all the scores were above score 5, meaning at least moderate improvement and satisfaction of all the participants that were included in the clinical case series. More importantly, median score for the patients evaluation with the satisfaction of the overall aesthetic is 8.5, and physician improvement score 8.0 showing significant to near-complete satisfaction and improvement with the Fotona4D HoneyComb+ treatment after 3 treatment sessions.

Compared to single-modality treatments, the Fotona4D HoneyComb+ approach enables synergistic multi-layer targeting from epidermis to deep dermis layers, enhanced collagen stimulation via i-HBM, comprehensive rejuvenation improving skin texture, laxity, contour and pigmentation^{3,4,6} with minimal down-time. Future studies with larger sample size, longer and consistent follow-up, and comparative designs are needed to validate and quantify long-term effects.

Conclusion

The Fotona 5D protocol incorporating HoneyComb tightening provides effective, safe, and well-tolerated non-invasive facial

rejuvenation. The multimodal approach addresses epidermal, dermal, and subdermal aging components and represents a refined evolution of established Fotona 4D technology.

The Fotona4D HoneyComb+ protocol appears to be a safe and effective non-invasive treatment for facial rejuvenation, providing great improvements in skin quality, tightening, and facial contour. The incorporation of HoneyComb® technology and i-HBM may represent an important advancement in laser-based aesthetic treatments, enabling deeper and more sustained regenerative responses.

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Conflict of interest

The author declares there is no conflicts of interest.

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