



Combining Fractional 1927 nm Thulium Laser and Subdermal 1470 nm Diode Laser for Facial Aesthetic Procedures: Two Case Reports

Luana Campos¹, Yeon Jung Kim¹, Rogério Nagai¹, Luiz Felipe Palma², Luís Otávio Carvalho de Moraes³

¹Graduate Program in Implantology, University of Santo Amaro, São Paulo, SP, Brazil

²Department of Pathology, Federal University of São Paulo, São Paulo, SP, Brazil

³Department of Morphology and Genetics, Federal University of São Paulo, São Paulo, SP, Brazil

*Correspondence to

Yeon Jung Kim,
Email: yjkim@prof.unisa.br

Received: December 17, 2024

Accepted: August 19, 2025

ePublished: September 24, 2025



Abstract

Introduction: Skin aging involves a complex series of biological processes, resulting in alterations that can impact the aesthetics and well-being of patients. There has been a notable rise in the demand for safe, efficient, and effective treatments for skin aging in recent years; among them, laser-based treatments have gained rapid global popularity. Thus, the current study aimed to present two clinical cases in which a very conservative approach using a combination of laser devices was adopted to simultaneously correct certain facial aesthetic issues.

Methods: Two patients sought aesthetic treatment for facial sagging, especially regarding the loss of mandibular contour due to fat accumulation in the submental region, in addition to dark spots and dark circles. The treatment proposed was performed using a combination of fractional 1927 nm thulium laser and subdermal 1470 nm diode laser in a single session.

Results: Within 30 days, both patients noticed an improvement in the aesthetics of their faces, and after 90 days, there was a significant perception of reduced submental fat, facial lifting, and a reduction in facial pigmentation.

Conclusion: Combining different laser wavelengths appears to be an effective, simple, and conservative option for simultaneously managing certain facial aesthetic concerns.

Keywords: Esthetics; Face; Subdermal diode laser; Thulium laser.

Introduction

Skin aging involves a complex series of biological processes, influenced not only by intrinsic and chronological factors but also by the cumulative impact of external elements, such as ultraviolet radiation.¹ As a result, the skin becomes thinner, dry, pale, and sagging, with decreased elasticity, and it may exhibit wrinkles of varying features and dyschromia.² The mechanisms of skin aging are thought to be based on senescence and altered biosynthetic activity of the skin cells, in addition to gross disorganization of the dermal matrix.³

Since the aging process is unavoidable for everyone,⁴ there has been a notable rise in the demand for safe, efficient, and effective treatments for skin aging in recent years.⁵ Topical medications, cosmetics, botulinum toxin, fillers, and chemical peels are among the most popular and longstanding options⁶; however, energy-based devices using radiofrequency and laser-based treatments have gained rapid global popularity.⁵

The most popular type of laser employed for facial skin rejuvenation is the ablative one (e.g., CO₂ or Er:YAG), in which the concept of delivering light energy for selective thermolysis of the epidermal and dermal

layers is responsible for its therapeutic effects.⁷ On the other hand, nonablative fractional lasers and subdermal lasers (endolaser), that is, mid-infrared devices with wavelengths ranging from 1320 to 1940 nm, are also very popular. They lead to controlled thermal injury to the dermis, triggering a subsequent dermal wound healing response while preserving the integrity of the epidermis.⁸ The rationale behind their use lies in achieving many of the benefits of the full-face ablative technique, while mitigating the substantial recovery time and reducing the risk of complications.⁹

Considering the absence of previous similar reports, the current study aims to present two clinical cases in which a very conservative approach using a combination of fractional 1927 nm thulium laser and subdermal 1470 nm diode laser was adopted for the simultaneous correction of certain facial aesthetic issues.

Case Reports

Case 1

A 52-year-old Asian male patient, with phototype III and no comorbidities, sought aesthetic treatment for facial sagging, especially regarding the loss of mandibular

contour due to fat accumulation in the submental region, in addition to dark spots and dark circles (Figure 1A, C). He had no history of prior aesthetic treatments and asked for a conservative treatment that could maintain a natural appearance.

Dermal irradiation for skin treatment and subdermal irradiation for fat reduction and skin retraction were proposed as a treatment. Initially, under local tumescent anesthesia utilizing Klein solution (0.9% physiological saline, 1:1000 epinephrine, 2% lidocaine, and 10% sodium bicarbonate), a subdermal high-power diode laser (Wuhan Pioon Technology Co., China) emitting at 1470 nm (6 W) and in pulsed mode (with an activation period of 75 ms and a deactivation period of 25 ms) was applied in the lower third of the face and cervical region. In the cervical region, three entry points were made, where vectors were distributed to deliver a total energy of 1500 J. In the lower third of the face, two entry points were made, one on each hemiface, with vectors directed toward the center of the face, delivering 600 J of energy bilaterally (Table 1). To minimize complications, thermal control was meticulously performed.

Immediately afterward, the patient's face was irradiated with a fractional 1927 nm thulium laser (Lavieen Laser™, Wontech, South Korea), emitting 500 μ s, 4 W, and 0.5 mm strictly on the region of pigmentation. The same protocol was repeated twice on the entire face, but with a pulse duration of 450 μ s (Table 1).

Mild edema and erythema were observed after the clinical procedures, but no postoperative drugs were required. The patient was advised to apply sunscreen and moisturizers for a period of seven days on the irradiated areas, in addition to undergoing 10 sessions of lymphatic drainage (2 sessions per week). Within 30 days, the patient noticed an improvement in the appearance of his face, and after 90 days, there was a significant perception of reduced submental fat, facial lifting, and reduction of dark spots (Figure 1B, D).

Case 2

A 60-year-old Caucasian female patient, with phototype III, osteoarthritis and controlled arterial hypertension, sought aesthetic treatment for facial sagging, especially regarding the loss of mandibular contour due to fat accumulation in the submental region, in addition to dark spots and dark circles (Figure 1E, G). She had no history of prior aesthetic treatments and asked for a conservative treatment that could maintain a natural appearance.

The same laser devices from Case 1 were used, and the same clinical steps were followed. Initially, under local tumescent anesthesia utilizing Klein solution (0.9% physiological saline, 1:1000 epinephrine, 2% lidocaine, and 10% sodium bicarbonate), a subdermal high-power diode laser (Wuhan Pioon Technology Co., China) operating at 1470 nm (6 W) in pulsed mode (with an activation period of 75 ms and a deactivation period of 25 ms) was applied



Figure 1. Clinical Follow-up. (A, E) Initial clinical presentation in frontal view for the Cases 1 and 2, respectively. (C, G) Initial clinical presentation in lateral view (90°) for Cases 1 and 2, respectively. (B, D) Case 1 - evaluation in 90 days after laser treatment, showing submental fat reduction, with improvement of mandibular contour, facial lifting, and reduction of pores and dark spots. (F, H) Case 2 - evaluation in 90 days after laser treatment, showing submental fat and sagging reduction, also with improvement of mandibular contour, facial lifting, and reduction of pores and dark spots.

Table 1. Laser Parameters

Specifications	Unit	
Type of laser	Diode	Thulium
Emission mode	Pulsed	Continuous
Time on/Time off	75 ms / 25 ms	-
Delivery system	Optical fiber	Articulated arm
Energy Distribution	500-1500 J	-
Peak power	6 W	4 W
Average power	4 W	4 W
Focus spot area or fiber	0.04 cm (optical fiber)	10x10 mm
Focus-to-tissue	Subdermal	In contact
Peak power density at spot area	2500 W/cm ²	4 W/cm ²
Beam divergence	No	No
Water irrigation	No	No
Air and aspirating airflow	No	No

in the lower third of the face and cervical region. In the cervical region, three entry points were made, where vectors were distributed to deliver a total energy of 800 J. In the lower third of the face, two entry points were made, one on each hemiface, with vectors directed toward the center of the face, delivering 500 J of energy bilaterally. For the dark circles, the upper eyelid areas were irradiated with 3 W and 50 J, and the lower eyelid areas with 3 W and 120 J (bilaterally). Immediately afterward, the patient's face was irradiated with a fractional 1927 nm thulium laser (Lavieen Laser™, Wontech, South Korea), emitting 500 μ s, 5 W, and 0.5 mm strictly in the region of pigmentation. The same protocol was repeated twice on the entire face, but with 400 μ s and 0.8 mm (Table 1).

Mild edema and erythema were observed after the clinical procedures, but no postoperative drugs were required. The patient was advised to apply sunscreen and moisturizers for a period of seven days on the irradiated areas, in addition to undergoing 10 sessions of lymphatic drainage (2 sessions per week). Within 30 days, the patient noticed an improvement in the appearance of her face, and after 90 days, there was a significant perception of reduced submental fat, facial lifting, and reduction of dark spots and dark circles (Figure 1F, H).

Discussion

The current manuscript presents clinical cases in which the fractional 1927 nm thulium laser and the subdermal 1470 nm diode laser, two lasers recently popularized in the aesthetic field, were used simultaneously for treating facial sagging and areas of hyperpigmentation with a single session. To the best of the authors' knowledge, no other papers have tested this combination, a fact that makes the case report quite valuable.

Although the laser wavelength of 1470 nm is considered to be preferentially absorbed by water, our results and other studies have shown suitable effects on fatty tissue,^{10,11}

which could improve the patient's mandibular contour loss due to fat accumulation in the submental and cervical regions. Considering skin appearance, authors have reported an improvement in the density and thickness of both the epidermis and dermis following endolifting due to new collagen formation and collagen remodeling, as well as an increase in skin elasticity.¹²

In turn, the fractionated 1927 nm thulium laser appears to be particularly beneficial for treating epidermal conditions such as pigmentation disorders and actinic keratosis. This laser can create a cutaneous injury zone in the papillary dermis with a semi-ablative action, but its exact biological mechanisms in aesthetic procedures have yet to be elucidated.¹³ It is believed that this laser may primarily target epidermal cells, reverse the disruption of the dermo-epidermal junction, and promote neocollagenesis and neoe elastinogenesis in the upper dermis, the layer where melanophages reside.¹⁴ In sum, fractionated 1927 nm thulium was used herein to improve facial skin aesthetic features and to treat dark spots and dark circles.

Overall, the association of both laser wavelengths could improve facial contouring and slimming, as well as promoting the whitening and reduction of pores on the face, while preserving vital structures. These minimally invasive techniques had the advantage of avoiding skin incision-related complications (i.e., skin disruption, ectropion, bleeding). In addition, the predictability of the procedure can help to increase patient satisfaction, safety, and effectiveness.

Concerning the inherent limitations of this study, case reports are categorized among the lowest levels of scientific evidence, largely owing to their considerable vulnerability to publication bias. Nevertheless, such investigations retain significant utility for conditions insufficiently addressed in the literature or for presenting innovative therapeutic modalities,¹⁵ as demonstrated by the cases presented here.

Conclusion

Combining a fractional 1927 nm thulium laser and a subdermal 1470 nm diode laser appears to be an effective, simple, and conservative option, with a short recovery time for simultaneously managing certain facial aesthetic concerns. However, more studies are needed to reach a definite conclusion.

Authors' Contribution

Conceptualization: Luana Campos, Yeon Jung Kim, Rogério Nagai, Luís Otávio Carvalho de Moraes.

Data curation: Luana Campos, Yeon Jung Kim, Rogério Nagai.

Formal analysis: Luana Campos, Luiz Felipe Palma, Luís Otávio Carvalho de Moraes.

Investigation: Yeon Jung Kim, Rogério Nagai.

Methodology: Luana Campos.

Project administration: Luana Campos, Yeon Jung Kim, Luiz Felipe Palma.

Resources: Luana Campos.

Supervision: Luana Campos, Yeon Jung Kim.

Validation: Luana Campos, Luiz Felipe Palma.

Visualization: Luana Campos, Luiz Felipe Palma, Luís Otávio Carvalho de Moraes.

Writing—original draft: Yeon Jung Kim, Rogério nagai.

Writing—review & editing: Luana Campos, Luiz Felipe Palma, Luís Otávio Carvalho de Moraes.

Ethical Approval

Written informed consent was obtained from the patients.

Funding

None.

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