THE GEEK CHRONICLES
Pages of Discovery...

Case Report | Chronicles of Clinical Reviews and Case Reports | Open Access

Diode Laser Assisted Facial Lifting: A New Technique and Cases Report.

Pilar Blanco Florez [1*], Lina Maria Franco Gonzalez [2], Raúl Andrés Montes García [3]

[1] Laser specialist dentist, cosmetologist and lymphatic drainage technician. Santa Marta, Colombia*
[2] Dentist, Oral Maxillofacial Surgeon, Master in Basic Biomedical Sciences. University of Antioquia. Medellín, Colombia.
[3] Dentist, Researcher, Colombia.

ARTICLE INFO

2024 Volume 1
https://www.doi.org/ccrcr.2024.tgc.0337

Article History:
Received: Oct 22, 2024
Accepted: Nov 10, 2024
Published: Dec 27, 2024

Citation: Florez PB, Gonzalez LMF, Montes García, R. A. (2024). Facial Endolifting Technique with Laser Diode: A New Technique and Report Of Cases. Chronicles of Clinical Reviews and Case *Reports*, The Geek Chronicles, 1, 1-9.

Keywords: endolifting; collagenogenic; photoaging.

ABSTRACT

The facial aging process is the result of anatomical changes in the facial bones and muscles that are ultimately expressed in the elasticity of the skin. Different strategies have been proposed for the management of photoaging such as radiofrequency, fillers, ablative laser with erbium:YAG laser (Er:YAG) and carbon dioxide laser; these last methods have demonstrated benefits in the effectiveness for skin rejuvenation. The minimally invasive facial endolifting technique reported with photothermal, photochemical advantages and long-term results.

Introduction

The aging process appears as a result of the combination of anatomical facial changes in bones, ligaments, muscles, fat and skin that are ultimately expressed as a reduction in elasticity and progressive atrophy of the dermis [1].

The face and neck are structured by different fascia, which overlap each other, each of them having a unique orientation that is crucial for maintaining the physiognomy of each muscle and skin [1].

The skin is supported by an extracellular matrix (ECM), which is essential for maintenance and homeostasis. The ECM is made up of proteins, mainly collagen fibers (collagen type XII) that are arranged in a network to withstand tension and stress forces; components such as proteoglycans (decorin and biglycans), tenacin [2], and collagen fibers types I, III, and V [3] are also found, which are mainly affected by photoaging. The reduction of the ECM during aging appears as a result of the combination of anatomical facial changes in bones, ligaments, muscles, fat, and skin that are ultimately expressed as a reduction in elasticity and progressive atrophy of the facial dermis and epidermis.

Changes with age in the facial bones are most frequently observed in different areas: 1) Orbital zone, presenting lateral translation of the orbit, protrusion of the glabella, expansion of the supraorbital rim; 2) Malar zone, an increase in the depth and expansion of the cheeks; 3) Nasal zone, increase in the length, width, and vertical dimension of the nose and 4) Occlusal zone, with an increase in the vertical height in the occlusal region associated with the increase in mental prominence. The muscles and ligaments associated with facial aging are described in Image 1 [4,5,6].

Image 1. *Facial Aging Areas.*

A) *Glabellar area; where the corrugator supercilii, depressor supercilii and orbicularis oculi muscles intervene.* ***B)*** *Area formed by the retro-orbicularis oculi fat pad, orbicularis ligament and frontalis muscle.* ***C)*** *Area formed by the zygomatic orbicularis ligament.* ***D)*** *Area formed by the nasolabial and nasolabial grooves.* ***E)*** *ligament that joins the skin and all adjacent structures to the bone [6].*

Changes in the facial ligaments and muscles are related to bone changes. The main ligaments affected are the zygomatic, mandibular and medial palpebral ligaments, which are relevant to the characteristics of the facial skin, dermis tension, fat containment, expression of wrinkles and fatigue, signs associated with facial aging of the periorbital area, nasolabial fold, nasolabial fold, buccinator and platysma [7,8].

Different treatments have been established for the management of photoaging such as radiofrequency, fillers, ablative laser with erbium: YAG laser (Er:YAG) and carbon dioxide laser [9]; these last methods have demonstrated benefits in the effectiveness for skin rejuvenation. Studies have described that after laser exposure, a significant increase in the production of collagen type III has been observed after 72 hours of treatment in most tissues through the production of metabolites called propeptides [10,11]. However, these lasers are ablative due to their photothermal effect on the superficial layer of the skin, which results in temporary and short-lasting effects. On the other hand, the high-power diode laser presents not only photothermal characteristics, but also photochemical ones, a property that allows a collagenogenesis action through the production of collagen and elastin in the treated areas [12]. In turn, laser wavelengths between 400nm and 1064nm are absorbed by hemoglobin, oxyhemoglobin and melanin, with those with the highest absorption being visible, and their penetration effect is proportionally inverse, the longer the wavelength, the greater the penetration.

Taking into account the above, a minimally invasive endolifting technique is presented, with photothermal, photochemical characteristics, whose results are not transitory, they remain long-term.

Facial Endolifting Technique:

The technique reported below requires some general biosafety considerations for the patient and biological considerations for the skin.

1. Biosafety in the use of lasers

Use of safety glasses: Glasses are an essential item for the patient, operator and assistant when handling the laser. It must be verified that the glasses have specifications for the wavelengths to be used.

2. Diode Laser

2.1 Length Laser Type: Considering that a high-power diode laser is used, the parameters that must be taken into account are: 1) Biological effects: Power/ Irradiated area (W/ area) 2) Irradiation time: times must be short. 3) Work area: define the area to be treated by marking with a white surgical pencil. 4) Laser penetration depth.

2.2 Wavelength: In endolifting, wavelengths of 980nm and 1470nm can be used to perform the procedure, with the 980nm wavelength having advantages in the photothermal and photochemical effect, which translates into long-term results.

2.3 Fibers:

2.3.1 Fibers used: There are fibers of 200m, 300m, 400m, 600m and 800m; the fiber recommended in this study is 400m, since the lower fibers can break inside the tissue and cause complications during removal. The use of fibers with a larger diameter than 400m does not allow good accessibility to the skin, which can make the procedure more traumatic.

2.3.2 Fiber verification: check the sterility, the fiber must be well cut with precision with a special fiberglass cutter to avoid splinters, fractures in the fiber and to

avoid sharp ends (photo of fibers, photo of cutter). It is recommended to verify this before, during and after the procedure (Image 2).

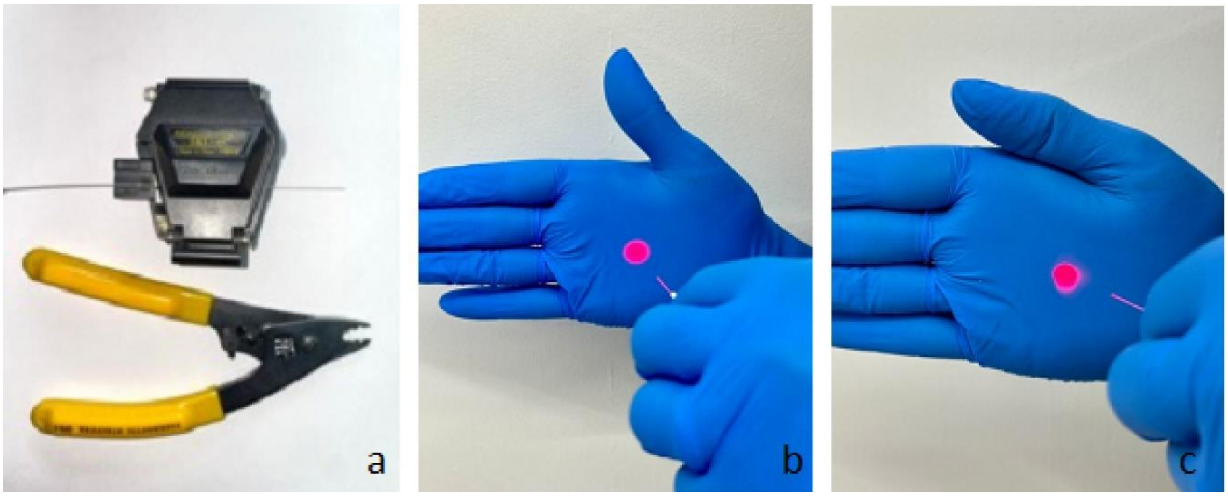

Image 2.

a) *Precision fiberglass cutter.* ***b)*** *Verification of fiber in adequate conditions, circular definition of the laser light is observed.* ***c)*** *Fiber in non-optimal conditions, distortion of the circumference of the laser light is observed.*

3. Clinical evaluation and skin conditions prior to the procedure

For each patient, personal medical history must be assessed, within which the consumption of medications is important, given that there are groups of drugs that are photosensitive (cardiovascular, anti-inflammatory, antineoplastic, anti-infectious, nervous system, metabolism/endocrine and others13) with which the patient may feel more heat than necessary and exogenous (retinoic and glycolic acid), since these can cause skin spots at the site of irradiation. Once the clinical and physical evaluation of the patient is completed, the patient is informed of the procedure and the informed consent is signed.

3.1 Skin preparation: The skin requires prior preparation to perform the endolifting procedure: Cleaning, toning, exfoliation and hydration. The skin is disinfected with the blue LED light cabin, then the amber light is applied in order to block the production of melanocytes and prevent the appearance of spots, finally the diode laser is applied for photo biomodulation of the area to be treated (image 3).

Image 3. *Skin preparation.*
a) *application of blue LED light,* ***b)*** *application of amber light and* ***c)*** *application of photo biomodulation diode laser.*

3.2 Zone marking: With a white surgical pencil, the entry points and path of the fibers are marked, anatomical points: frontal, infratemporal, frontal, masseter, perioral, submandibular and submental regions.

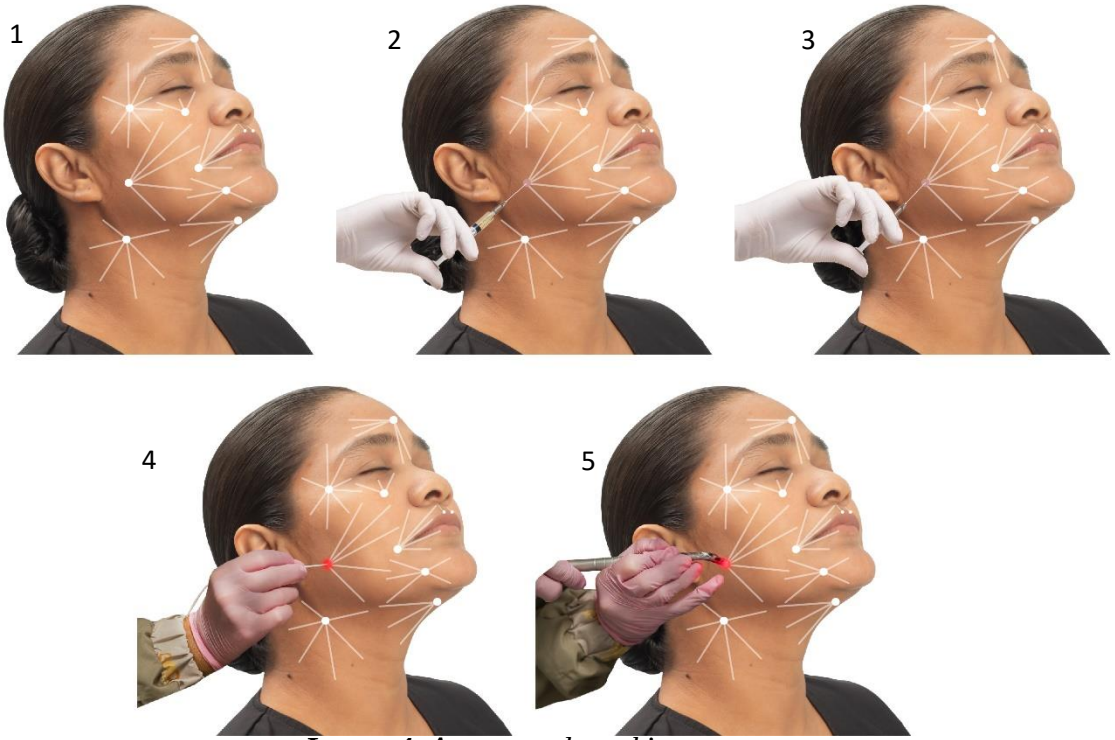

Image 4. *Access and marking areas.*
1) Access and marking areas, 2) Anesthesia placement area, 3) Fiber opening area, 4) Fiber entry, 5) Photobiomodulation of entry points.

3.3 Fiber entry area: Once the approach areas have been defined, the fiber is introduced using different 360-degree vectors and a fiber entry length of no more than 5 cm. To establish the entry point, the anatomical structures must be taken into account in order to provide safety and avoid complications. These include the facial artery, external ocular canthus, and lateral orbital rim. For the infratemporal approach, a distance of 1 cm must be taken into account from the external ocular canthus; for the perioral and masseteric access, the facial artery and its seven branches will be taken into account: lower labial, upper labial, lower alar, upper alar, nasal and lateral angular arteries, as well as small variable branches. For the submental access, 1 cm will be considered from the basilar rim of the symphysis. The submandibular access will be measured counting from the mandibular angle 1.5 cm to form a safe approach triangle for retromandibular incision that corresponds to zone III of the neck. Finally, for the frontal access, the supraciliary arches will be taken into account, where a horizontal line is established, then the midfacial point is identified, of which is defined by a 1cm perpendicular line, this point allows greater access to adjacent sites as well as avoiding compromise of the vascular system in the area (image 3.a).

4.4 Procedure: It is suggested to perform subcutaneous anesthesia with vasoconstrictor (image 3.b), in a papular form, with an 18G cannula, an opening is made in the skin so that the fiber can enter easily without causing trauma with a length no greater than 5cm in each of the markings made. Once all the points have been finished, photobiomodulation is performed with a 650nm or 660nm laser 200mW of power at the entry sites in order to reduce hematomas, with a tip of an area of 1cm2 for 40 seconds, in case it is applied with a power of 100mW it is indicated for a time of 80 seconds (image 3.3 and 3.4).

Clinical Cases

Case 1. Submental and submaxillary approach

Approach to a 56-year-old patient with loss of skin tone in the submental and submaxillary areas. After applying the endolifting technique with a high-power diode laser, a change in tone and flexibility of the affected skin is observed. (Image 5).

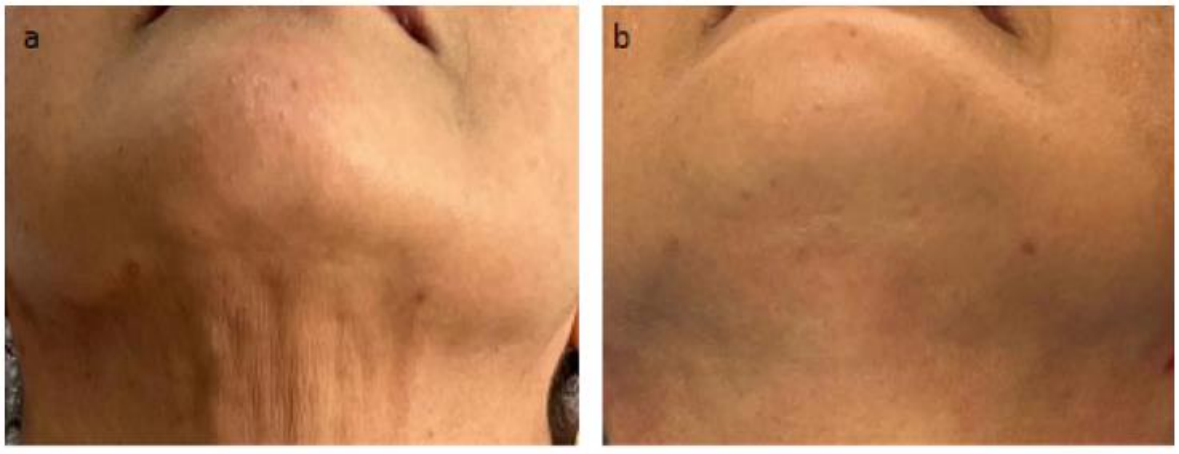

Image 5. *Submental approach.*

Case 2. Infratemporal approach: A 54-year-old patient presented loss of skin tone in the infratemporal area. After applying the endolifting technique with a high-power diode laser, the periorbital expression lines were observed, with a reduction in their depth (image 6).

Image 6. *Infratemporal approach.*

Case 3. Approach to nasolabial, mental and labial areas

In image 6a, patients present expression lines in the perioral area and deep nasolabial groove, in image 6b after application of the endolifting technique with high-power diode laser, in the affected areas, a greater definition of the mucocutaneous line of the upper lip and Cupid's bow is observed, as well as a reduction in the depth of the nasolabial fold and lip expression lines (Image 7).

Image 7. *Approach to the nasolabial fold and perioral area.*

Case 4. Submaxillary approach: 38-year-old patient with redundant tissue in the submaxillary area. After applying the submaxillary endolifting technique, an increase in the elasticity of the submaxillary skin was observed, resulting in a reduction of redundant tissue (Image 8).

Image 8. Submaxillary approach.

Ethical considerations

The present case is framed within Resolution 008430 of 1993, which establishes scientific, technical and administrative standards for health research. The 5 patients were informed about the procedure to be performed, the risks and benefits derived from it, and voluntarily signed an informed consent for the performance of the procedure, use of photographs and publication of the results.

Conclusion

The endolifiting technique with high-power diode laser is an option for the management of facial expression lines. The technique is safe, with long-lasting results due to the collagenogenesis induced by this technique.

References

1. Lapière CM. The aging dermis: the main cause for the appearance of 'old' skin. Br J Dermatol. 1990 Apr;122 Suppl 35:5-11.
2. Theocharis AD, Skandalis SS, Gialeli C, Karamanos NK. Extracellular matrix structure. Adv Drug Deliv Rev 2016 Feb 1;97:4-27.
3. Bruckner P. Suprastructures of extracellular matrices: paradigms of functions controlled by aggregates rather than molecules. Cell Tissue Res. 2010 Jan;339(1):7-18.
4. Mendelson B, Wong CH. Changes in the facial skeleton with aging: implications and clinical applications in facial rejuvenation. Aesthetic Plast Surg. 2012 Aug;36(4):753-60.
5. Enlow DH. A morphogenetic analysis of facial growth. Am J Orthodox. 1966 Apr;52(4):283-99.
6. Cotofana S, Fratila AA, Schenck TL, Redka-Swoboda W, Zilinsky I, Pavicic T. The Anatomy of the Aging Face: A Review. Facial Plast Surg. 2016 Jun;32(3):253-60.
7. Furnas DW. The retaining ligaments of the cheek. Plast Reconstr Surg. 1989 Jan;83(1):11-6.
8. Stuzin JM, Baker TJ, Gordon HL. The relationship of the superficial and deep facial fascias: relevance to rhytidectomy and aging. Plast Reconstr Surg. 1992 Mar;89(3):441-9; discussion 450-451.
9. Fitzpatrick RE, Rostan EF, Marchell N. Collagen tightening induced by carbon dioxide laser versus erbium: YAG laser. Lasers Surg Med. 2000;27(5):395-403.
10. Mienaltowski MJ, Birk DE. Structure, physiology, and biochemistry of collagens. Adv Exp Med Biol. 2014;802:5-29.
11. Haukipuro K, Risteli L, Kairaluoma MI, Risteli J. Aminoterminal propeptide of type III procollagen in wound healing in humans. Ann Surg. 1987 Dec;206(6):752-756.
12. Nilforoushzadeh MA, Heidari-Kharaji M, Fakhim T, Hanifnia A, Nouri M, Roohaninasab M. Endolift laser for jowl fat reduction: clinical evaluation and biometric measurement. Lasers Med Sci. 2022 Jul;37(5):2397-2401.
13. Hofmann GA, Weber B. Drug-induced photosensitivity: culprit drugs, potential mechanisms and clinical consequences. J Dtsch Dermatol Ges. 2021 Jan;19(1):19-29.