

# EFFECTIVENESS OF USING 1470NM SUBDERMAL LASER TECHNOLOGY IN

# SUBMENTONIAL FAT - CLINICAL CASE PRESENTATION

# Efficacy evaluation of the use of 1470nm subdermal laser technology in submental fat - clinical case presentation

Efficacy evaluation of the use of 1470 nm subdermal laser technology in submental fat clinical case presentation

Fabrizio Manoel Rodrigues1, Luciana Camargo Khachikian,2, Natalia Previato2 Daniela Moleiro2.

#### SUMMARY

**Objective:** To present the use of 1470nm Subdemic Laser technology in submental fat through clinical cases. **Case Details:** Four clinical cases were selected, and subdermal laser application at 1470nm was carried out individually for submental lipolysis, resulting in changes that improved the clinical and aesthetic characteristics of the neck region. **Conclusion:** It was concluded that the 1470nm subdermal laser technology in submental fat used in clinical cases represented an effective approach,

providing the reduction of adiposity and submetual dermal sagging in a concise, safe and non-traumatic way.

Keywords: face, laser, lipolysis, rejuvenation, retraction.

#### ABSTRACT

**Objective:** To present the use of 1470nm Subdemic Laser technology in submental fat through clinical cases. **Case Details:** Four clinical cases were selected, and subdermal laser application at 1470nm was carried out individually for submental lipolysis, resulting in changes that improved the clinical and aesthetic characteristics of the neck region.

**Conclusion:** It was concluded that the 1470nm subdermal laser technology in submental fat used in clinical cases represented an effective approach, providing the reduction of adiposity and submetual dermal sagging in a concise, safe and non-traumatic way.

Key words: face, laser, lipolysis, rejuvenation, retraction

Innovare College, São Paulo - SP

SUBMITTED ON:10/2023

ACCEPTED ON: 2/2024

I PUBLISHED ON: 3/2024

Faculdade UFABC-São Bernardo do Campo-SP), E-mail: fabrizio.rodrigues@ufabc.edu.br

#### SUMMARY

**Objective:** To present the use of 1470nm Subdemic Laser technology in submental fat through clinical cases. **Case Details:** Four clinical cases were selected and the application of subdermal laser at 1470 nm was performed individually for submental lipolysis, resulting in changes that improved the clinical and aesthetic characteristics of the neck region. **Conclusion:** It was concluded that the 1470nm subdermal laser technology in submental fat used in clinical cases represented an effective approach, providing the reduction of submetual dermal adiposity and flaccidity in a concise, safe and non-traumatic way.

Keywords: face, laser, lipolysis, rejuvenation, retraction.

#### INTRODUCTION

According to a survey carried out by the World Health Organization (WHO) in 2022, around 1 million people are overweight, of which 650 million are adults. Overweight is a condition characterized by the accumulation of adipose tissue throughout the body, that is, an increase in the size of adipocytes, which are cells that store energy in the form of fat and play a role in the body's thermal regulation, isolating it from cold and heat. heat1.

In the condition of overweight, this accumulation occurs in specific areas and causes changes in body contour, which has caused many people to undergo aesthetic surgical interventions, procedures that are invasive, with time away from daily activities and the need for post-surgical monitoring1.

According to the current lifestyle for in-office procedures, with little or no *downtime*, the Brazilian Society of Dermatology (SBD) revealed a 390% increase in demand for non-surgical procedures that result in a remodeling of the body contour2. In the search for these non-surgical interventions, we can mention laser lipolysis, occupying third place in the ranking of the most sought after aesthetic procedures in the office, a technique in which a laser is used with action on a specific target chromophore, in order to result in lipolysis due to its effect. photothermal in fat and water 3.4

The treatment of submental fat with non-surgical intervention has been the target of research with laser lipolysis techniques, using lasers that promote this lipolytic action and cause the reduction of adipose tissue in this region5-7. Among the laser technologies used, the one with a wavelength of 1470nm has become widely recommended for in-office treatments and even surgical procedures. Its high affinity for the water chromophore provides selective photothermolysis with heat transfer, generating adipocytolysis, being very effective in areas of medicine and aesthetics. This wavelength has significant coagulation properties, promoting a necrotic area of 1.3mm when used in surgery, a lower value when compared to equipment with a 980nm wavelength, for example, where the necrotic area was 4.18mm8.

When using lasers with a wavelength of 1470nm, it is necessary to understand that the biological effects are different in tissues, due to the different optical and mechanical properties of each area of application8, therefore the action characteristics of the 1470nm diode laser have been used in aesthetic treatments aimed at reducing fat tissue and also minimizing skin sagging as a secondary and very beneficial response in aesthetic harmonization9,19,20,21.

In the subdermal laser technique, small incisions are made in the tissue, which do not require subsequent sutures, as they are small access points for the equipment's optical fiber. In Figure 1, laser lipolysis can be seen, in which energy delivery occurs through a laser-emitting fiber, whether or not guided by a cannula, collimating its energy in a controlled manner into the target tissue. This 22

In this way, the specific wavelength of the laser is delivered to the subdermal fat, leading to the rupture of the adipocyte membrane and consequently the release of the adipocyte contents10.

Therefore, it is necessary to know the optical properties that occur in the layers of the epidermis, dermis and also in the subcutaneous layer, since they are histologically and physiologically different from each other 10

. In Figure 1, an illustration of the passage of a cannula with optical fiber into the subdermis can be seen. to be laser treatment was carried out.



Figure 1. Illustration of passage of a cannula with optical fiber into the subdermis. Source: Lukac, Matjaz et al10.

The optical window in the dermis and adipose tissue, which is between 400nm and 1500nm, presents, as a physical phenomenon, greater scattering in relation to absorption 10,11presentation of absorption and scattering coefficients in subcutaneous fat in this optical range. Histological section of area treated with 1320nm laser, visualization of adipocyte membrane rupture, blood vessel coagulation, and cannula passage region.

The objective of this work was to present the use of 1470nm Subdemic Laser technology in fat submental area through 4 clinical cases.

#### DESCRIPTION OF CLINICAL CASES

20 female patients aged between 40 and 65 years were treated who reported aesthetic complaints and presented increased adipocyte volume and sagging in the submental region, with clinical indication for the procedure with laser lipolysis at a wavelength of 1470nm. All patients were informed with the Free and Informed Consent form, as well as authorization to use images, which were duly completed and signed for diagnostic, scientific and didactic purposes.

The equipment used in this study was the LiftEndo *dual wave* Laser illustrated in **figure 2** (Medical San, Estrela, Rio Grande do Sul, Brazil) registered with ANVISA under number 82338020003. This system emits lasers in two wavelengths: 980nm and 1470nm, presenting peak power at 30W and 17W respectively.



Figures 2. LiftEndo equipment (Medical San, Brazil).

The clinical sequence of the technique followed the following protocol:

- 1. Cleaning the area to be treated with 2% aqueous chlorhexidine
- 2. Pertussis anesthesia performed with 2% lidocaine hydrochloride without vasoconstrictor (Xylestesin, Cristália, São Paulo, Brazil)
- 3. Opening of the orifice with an 18G hypodermic needle and anesthesia in retroinjection of the vectors with microcânula 22G.
- 4. Eye protection for the patient and operator with the protective glasses that come with the equipment
- 5. Equipment programming was carried out according to individual planning for each patient
- Introduction of the 600µm optical fiber in the port in retro application in predetermined vectors by marking until the planned amount of energy is reached
- 7. Application of an occlusive dressing to the perforations
- 8. Application of functional elastic bandage (tapping)
- 9. Manual Lymphatic Drainage (MLD) sessions starting after 72 hours with weekly intervals for 30 days.

The treatments were carried out using the wavelength 1470nm continuous mode, power between 4 and 6W, total energy accumulation between 800 and 1500 j, distributed in a fan shape from the central opening to both sides, left and right, respecting the limits anatomical: lower margin - upper border of the cricoid cartilage; posterior margin - medial border of the sternocleidomastoid muscle, anatomical structures of the submental region that can be seen in **Figure 3**. and the application demonstrated in **Figure 4**.



Figure 3. Anatomical structures of the submental region Source: A Face11



Figure 4. Introduction of optical fiber into the submental fat region. Source: authors.

# **Presentation of Clinical Cases:**

Patient 1: gender F; age: 42 years old. It can be seen before and after the procedure in Figure 5.

In patient 1, the 1470nm wavelength was used, with a power of 4w, using a fiber of 600 microns, total energy in joules of 500j on each hemiface, totaling 1000j in total in continuous mode.



Figure 5. Patient 1: before and after. Source: authors.

Patient 2: gender F, Age: 64 years old. It can be seen before and after the procedure in Figure 6.

In patient 2, the 1470nm wavelength was used, with a power of 5w, using a fiber of 600 microns, total energy in joules of 750J on each hemiface, totaling 1500J in total in continuous mode.



Figure 6. Patient 2, before and after. Source: authors.

Patient 3, sex F, age: 64 years old. It can be seen before and after the procedure in Figure 7.

In patient 3, the 1470nm wavelength was used, with a power of 5W, using fiberglass. 600 microns and total energy in joules of 600J on each hemiface, totaling 1200J in total in continuous mode.



Figure 7. Patient 2, before and after. Source: authors.

Patient 4, sex F, age: 40 years old. It can be seen before and after the procedure in Figure 8.



In patient 2, the 1470nm wavelength was used, with a power of 5W using fiberglass. 600 microns and a total energy of 600J for each hemiface, totaling 1200J in continuous mode.

Figure 8. Patient 4-before and after, 30-day interval. Source authors

### DISCUSSION

Surgical procedures have implications ranging from time off work, infectious complications, seromas or even sagging skin, laser lipolysis emerged as a technique in which surgical complications were minimized and without the need for the patient to be away from work with a faster recovery. quick and less discomfort after the procedure10.

In this way, it is emphasized that treatments carried out with high technologies, such as the subdermal laser at an infrared wavelength of 1470nm, provide a refinement to outpatient treatments carried out in the submental fat region, demonstrating high effectiveness as a non-surgical alternative for patients treated on an outpatient basis.

Laser lipolysis occurs by selective photothermolysis (photo = light and thermolysis = controlled heat), through the energy emitted by the laser. To do so, we have two target chromophores: fat and water. The thermal effect causes structural denaturation of collagen fibers, resulting in, in addition to the liquefaction (emulsification) of fat, an immediate and progressive retraction of repair and biostimulation in the skin tissue12. The external temperature must not exceed 40° to 42°C, controlled by a digital thermometer or thermographic camera, thus avoiding injuries and even unsightly burns. The internal temperature promoted must be between 48° to 50°C, with the purpose of inducing irreversible adipocytolysis, also remembering that adipose tissue has the characteristic of thermal insulation, observed in clinical practice, which after the laser emission pause the The tissue still remains warm after a few minutes, which justifies the secondary effect of the procedure, in which we observe immediate tissue retraction. In this temperature range, the denaturation of adjacent collagen fibers also occurs, consequently stimulating neocollagenesis and skin retraction through activation of Thermal Shock Proteins, HSP47, activated by the increase in temperature in biological tissues, which generates the formation of type I collagen. and III post procedure13.

In a study using 1320nm and 1064nm lasers, it was found that, histologically, the passage of optical fibers and delivery of energy resulted in thermally coagulated collagen fibers, ruptured and denatured fat cell membranes and cavities created by mechanical cannulation, represented in14.

Laser lipolysis with a wavelength of 140nm promotes an improvement in the contouring effect as well as tissue retraction in the treated region15 in facial studies, the literature still presents us with data on the effectiveness of treatment with this wavelength, where local anesthesia and treatment with concisely selected parameters make the technique safe and effective16,17.

In order to prove the improvement, including the reduction of dermal flaccidity in laser lipolysis treatments with subdermal laser, it is through a complementary exam, which is carried out by ultrasound, and through this exam, it is identified that there is an increase in skin thickness, both in the dermis and epidermis. In addition to ultrasound, it is possible to evaluate treated cases with before and after photographs17, and in this study this way of evaluating the results obtained was adopted, and as in the literature, the images showed a significant improvement in the facial profile of the treated patients.

Through studies on the endolaser, it is clear that its non-ablative performance, with outpatient and minimally invasive treatment, has become an excellent treatment option, in which the wavelength, in the case of treating submental fat, occurs selectively due to specific chromophores of water and adipose tissue. And its indication is to remodel and melt fat, but also to promote neo-collagenesis in the superficial dermis, thus improving the contour of the face and thus reducing sagging in the jowl region. The penetrability of 1470nm is 3-4 mm, where it passes through the stratum corneum and also acts on interstitial water in the deep dermis.

Through the remodeling of collagen and the Photobiomodulation that occurs in the connective tissue through the application of the subdermal laser, a 'skin tightening' effect occurs (this effect is described as 'skin tightening'-skin tightness). And this sagging is reduced and superficial wrinkles are smoothed, this result is visible immediately after applying the therapy and continues to progress over weeks and months after treatment. Therefore, skin rejuvenation becomes more evident even after 6 or 12 months18-19.

#### CONCLUSION

It was concluded that the 1470nm subdermal laser technology in submental fat used in clinical cases represented an effective approach, providing the reduction of adiposity and submetual dermal flaccidity in a concise, safe and non-traumatic way, delivering an aesthetic result of facial contours and tissue retraction. in a safe way.

#### THANKS

I thank the Innovare faculty for the possibility of promoting this bibliographic review and the company Medical San for providing the equipment for the clinical study.

#### REFERENCES

- [PMC free article] [PubMed] 1. Wang P, Mariman E, Renes J, Keijer J. The secretory function of adipocytes in the physiology of white adipose tissue. J Cell Physiol. 2008;216(1):3-13.
- Piccolo D, Mutlag MH, Fusco I, Bonan P. Facial and body contouring with 1444 nm Nd:YAG laser-assisted lipolysis: Clinical evidence. Skin Res Technol. 2023;29(7): e13400.
- Khoury JG, Saluja R, Keel D, Detwiler S, Goldman MP. Histologic evaluation of interstitial lipolysis comparing a 1064, 1320 and 2100 nm laser in an ex vivo model. Lasers Surg Med. 2008; 40(6):402-6.
- Parlette EC, Kaminer ME. Laser-assisted liposuction: here's the skinny. Semin Cutan Med Surg. 2008; 27(4):259-63.
- Kim KH, Geronemus RG. Laser lipolysis using a novel 1,064 nm Nd:YAG Laser. Dermatol Surg. 2006; 32(2):241-48.
- Goldman A. Submental Nd:Yag laser-assisted liposuction. Lasers Surg Med. 2006 Mar;38(3):181-4. Surgery, v. 38, n. 3, p. 181-184, 2006.
- Prado A, Andrades P, Danilla S, Leniz P, Castillo P, Gaete F. A prospective, randomized, double-blind, controlled clinical trial comparing laser-assisted lipoplasty with suction-assisted lipoplasty. Plast Reconstr Surg. 2006; 118(4):1032-1045.
- 8. Schumilova NA, Fedotova Y, M. A. Ruabova MA. Biological effects of contact action of 1470 vs. 810 nm semiconductor lasers in vitro. 2014; 6 (4): 62-66.
- Furtado GR, Barbosa KL, Costa MF, Lustosa DB, Castilho VA, Tardin CD, et al. Applicability of the 1470 Nm Diode Laser in Facial Aesthetics: An Evidence-Based Review. Journal of Advances in Medicine and Medical Research.ased Review. JAMMR, 2023; 35 (21): 186-196.
- Matjaz Lukac M, Vizintin Z, Zabkar J, Pirnat S. QCW pulsed Nd: YAG 1064 nm laser lipolysis. J Laser Health Acad. 2009; 4 (1): 24-34.
- 11. The Face Illustrated Atlas of Clinical Anatomy, Ralf J Radianski / Karl H. Wesker, Second edition pg 124; 2016
- Tagliotto S, Medeiros VB, Leite OG. Laserlipolysis: update and literature review. Surg Cosmet Dermatol 2012;4(2):164-74.
- Mordon SR, Wassmer B, Reynaud JP, Zemmouri J. Mathematical modeling of laser lipolysis. Biomed Eng Online.;7:10., 2008
- KHOURY, Jane G. et al. Histologic evaluation of interstitial lipolysis comparing a 1064, 1320 and 2100 nm laser in an ex vivo model. Lasers in Surgery and Medicine: The Official Journal of the American Society for Laser Medicine and Surgery, v. 40, n. 6, p. 402-406, 2008.
- Heller L, Menashe S, Plonski L, Ofek A, Pozner JN. 1470-nm Radial fiber-assisted liposuction for body contouring and facial fat grafting. J Cosmet Dermatol. 2022;21(4):1514-1522
- Saran CGR, Simão LMR, Lizarelli R de FZ. Dual-wave liftlaser technique using diode lasers surgical procedures for orofacial harmonization. Aesth Orofacial Sci. 2023; 4(3):46-57.
- 17. Nilforoushzadeh MA, Fakhim T, Heidari-Kharaji M, et al. Endolift laser an effective treatment modality for forehead wrinkles and frown line. J Cosmet Dermatol 2022, 21:2463-68.
- Dias L, Almeida D, Petri CB, Souza MS, Souza DM 1470nm diode laser: an innovative, efficient and safe rejuvenation technique. Aesth Orofacial Sci. 2023; 5(2):48-58.
- 19. Alessandrini A. Gentle fiber optic laser lifting: a new approach to contouring the lower third of the face. Diploma Thesis. Fatebenefrateli Foundation of Rome, International School of Aesthetic Medicine. 2021
- Dias L, Almeida D, Borges F dos S, Bravin C, Cruz S, Caruso P, Almeida D, Bogado C. The 1470 Nm Diode Laser Effectiveness in Facial Fat Reduction with the Endolifting Technique: Pilot Study. IJMSCI 2024;10(06):6788-95.