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(REVIEW ARTICLE)

# Contraindications of using endolift subdermal lasertherapy technique in the treatment of aesthetic disorders

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## Abstract

**Introduction**: Endolift subdermal laser therapy is a promising technique for reducing fat and treating aesthetic disorders on skin and subcutaneous tissue. However, its application is not riskless, and it is essential to identify contraindications to ensure patient safety during its use.

**Objective**: This article aimed to describe the contraindications regarding the use of subdermal laser techniques (Endolift and/or Endolaser) used to treat aesthetic disorders.

**Methodology**: This study is characterized by exploratory research presented through a narrative review, to highlight the need for and importance of rigorous selection of patients initially chosen for treating aesthetic and/or functional dysfunctions with subdermal laser.

**Results**: The subdermal laser therapy which uses a laser beam of 1470 nm (Endolift) and/or 980 nm (Endolaser), presents important contraindications which must be considered before treatment. Among the main contraindications reported are allergies to anesthetics, blood dyscrasias, vascular disorders, use of anticoagulants, presence of biopolymers in the area to be treated, history of abnormal scarring (such as keloids), in addition to active epidermal lesions and decompensated autoimmune diseases.

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**Conclusion**: Recognizing contraindications of using Endolift is crucial for patient safety and treatment effectiveness and, therefore, careful evaluation of the patient's clinical history and pre-procedure examinations are important and, perhaps, necessary to minimize possible complications associated with the restrictions imposed by such contraindications.

**Keywords:** Endolift; Endolaser; Subdermal laser; Laserlipolysis; Contraindications

## 1. Introduction

The Endolift™ subdermal laser therapy technique (LASEMAR1500™ machine, Eufoton s.r.l.) became known worldwide using a laser beam with a 1470 nm wavelength emitted through an optical fiber inserted into the subdermal tissue with the aim of reducing subcutaneous fat and or tighten the skin through neocollagenesis [1, 2]. In some countries, it was also called aesthetic endolaser and was characterized using wavelengths of 1470 nm and 980 nm with the same therapeutic objectives [3, 4] being used alone or together in the same treatment session [5].

This subdermal laser therapy technique is intended to treat facial and body aesthetic dysfunctions, mainly expression lines and sagging skin, as well as localized adiposities and body lipodystrophies (cellulite) [6, 7]. Its versatility also allows it to act in some specific functional situations such as improving the quality of hypertrophic and/or keloid scars [8, 9], as well as axillary hyperhidrosis [10].

To produce the desired therapeutic effect, the endolift subdermal laser technique uses the photo hyperthermic effect on the subcutaneous tissue and this tends to produce a series of important physiological effects, such as an inflammatory and healing process [7, 11, 12, 13]. Furthermore, the use of some anesthetic solution may be important to reduce patient discomfort during the procedure [14, 15]. Therefore, the selection of patients who will undergo subdermal laser for aesthetic treatment requires a careful pre-treatment examination to choose inclusion and/or exclusion criteria to ensure that there are no complications or intercurrences due to the physiological actions arising the procedure or the use of anesthetic substances.

Among the most common contraindications chosen by some authors as exclusion criteria for the patient to undergo subdermal laser in the treatment of aesthetic dysfunctions are localized active epidermal lesions, decompensated autoimmune disease, history of severe scars (such as keloids), blood dyscrasias or track record use of antiplatelet agents, anticoagulants or photosensitizing medications, etc. [4, 5, 16, 17].

This study aimed to describe the contraindications regarding the use of subdermal laser techniques (endolift and or endolaser) used for treating aesthetic dysfunctions, in order to assure the technique can be safely carried out, and thus produce good results, avoiding adversities during and after the procedure.

## 2. Methodology

This study is characterized by exploratory research, presented through a narrative review to highlight the need for and importance of rigorous selection of patients initially chosen for the treatment of aesthetic and/or functional dysfunctions with subdermal laser. The review explored scientific articles published and available in the following databases: MEDLINE (Medical Literature Analysis and Retrieval System Online), PubMed (National Library of Medicine), SCIELO (Scientific Electronic Library Online), LILACS (Latin American and Caribbean Literature in Health Sciences) and Google Schoolar.

As an inclusion criterion, sources were selected that mentioned exclusion criteria or contraindications for the use of subdermal laser techniques (endolift and/or endolaser) aimed at treating various aesthetic and/or functional disorders related to the skin and subcutaneous tissue. Sources were discarded since they did not present a summary, those that were not allocated to scientific journals and did not address the topic of the study, as well as those that did not support the collection of reliable data.

The bibliographic survey was carried out in Portuguese, English, Spanish and Italian, with the following descriptors: Endolift, Endolaser, subdermal laser, laserlipolysis, contraindications.

## 3. Results and discussion

### 3.1. Main physiological actions of the subdermal laser

Subdermal laser therapy techniques (Endolift/Endolaser) use an optical fiber to emit laser radiation directly into the subcutaneous layer, close to the skin. This procedure is able to promote physiological effects that are fundamental to promoting damage to subcutaneous tissue and remodeling dermal tissues. These are techniques that act mainly through two mechanisms: lipolysis/adipocytolysis and the stimulation of neocollagenesis [4, 6, 18].

### 3.2. Adipocytolysis for removal of fatty tissue

Also known as laser adipocytolysis, laser lipolysis is a technique developed in the early 1990s that has become widely popular since then. The procedure consisted of the subcutaneous application of laser energy through a microcannula containing an optical fiber. This energy was then directed to the adipose tissue to be treated, and the resulting increase in temperature caused the destruction of adipose cells, leading to cell death [19].

Although the term *lipolysis* is widely used to describe subdermal laser practices, the thermal injury caused by the laser beam, actually is adipocytolysis from a histological point of view, characterized by the structural destruction of fat cells [20, 21]. The energy emitted by the subdermal laser is absorbed by fat cells in the subcutaneous tissue, generating controlled heating that can lead to these cells' destruction. Adipocytolysis is one of the fundamental principles of Endolift treatment, allowing the reduction of localized fat in various areas of the body [18]. Studies indicate that the 1470 nm laser is particularly effective in this process, due to its ability to penetrate deep into tissue and generate enough heat to destroy fat cells, without causing damage to adjacent tissues [6, 15, 18, 22].

Laser lipolysis has been shown to be less traumatic compared to conventional liposuction, providing faster recovery and over results in difficult-to-treat areas, such as thighs, upper abdomen and regions with fibrosis [20]. To optimize the adipocytolysis process, it is essential to keep the external temperature between 40°C and 42°C [23, 24], because when this temperature is noted on the skin, the internal temperature may be around 45°C to 50°C [13, 24], thus ensuring the controlled and progressive destruction of adipocytes for their subsequent elimination by the body without causing serum changes [25, 26, 27].

### 3.3. Collagen and Elastin Stimulation

The Endolift subdermal laser technique in addition to promoting adipocyte damage, produces a significant effect on the collagen and elastin's production in the dermal tissue, which is essential to assure the firmness, elasticity and support of the skin [2, 7, 16]. Similar to treatments that heat tissues such as radiofrequency and microfocused ultrasound, when the laser beam is applied under the skin it increases the local temperature in a controlled manner. This heating causes thermal denaturation of the dermal collagen fibers, leading to the breaking of the hydrogen bonds that stabilize the triple helix of amino acids, thus changing the conformation of the collagen fibers, which lose their three-dimensional structure and assume an amorphous shape (unwinding of the triple helix") [28, 29,30]. This process results in the immediate retraction of the skin, which allows some patients to have an immediate lifting effect after treatment with subdermal laser techniques.

At the same time, this controlled thermal damage can generate an inflammatory response in the skin, which is essential for dermal remodeling. Through this response, fibroblasts proliferate and begin to produce new collagen fibers, types I and III, which are vital for the regeneration of the skin extracellular matrix (neocollagenesis) [31, 32]. This new collagen production improves not only the skin firmness and elasticity, but also reorganizes the fibers in the dermis, resulting in a long-lasting lifting effect [22, 33, 34].

In this way, the heating provided by the use of the Endolift results in improvements in the texture, tone and density of the skin, providing a firmer and more rejuvenated appearance over time. The process of neocollagenesis occurs gradually, and the results become more visible as the months go by, as the new collagen network forms and organizes itself [2, 7, 16].

### 3.4. Controlled inflammatory response and tissue regeneration

The subdermal laser works by generating a controlled local inflammatory response [13, 14, 26, 27]. Initially, the intense inflammatory process induced by the laser action generates an excessive increase in local temperature and this is essential to inflame the site and thus activate fibroblasts' actions to stimulate collagen production and tissue repair [31, 32, 35]. However, depending on the degree of heating, the subdermal laser can also generate an anti-inflammatory effect

on the skin, being able to reduce chronic inflammation and regenerate damaged areas through controlled thermal action [36, 37].

Furthermore, authors [8, 9] reported that endolift is able to act by vaporizing fibrous tissue and coagulating small blood vessels. This can help regulate inflammation and speed up the local healing process, being especially effective in cases such as hypertrophic scars and keloids, where prolonged inflammation keeps the scar unsightly.

In summary, the subdermal laser can be effective in modulating inflammation, collagen production (high temperature) and might also act as a powerful anti-inflammatory agent (low temperatures), what makes it as a comprehensive solution to treat dermatological conditions that involve collagen inflammation and degradation.

### 3.5. Contraindications

During an exploratory review, different sources addressed contraindications related to the use of endolaser in the treatment of aesthetic dysfunctions. Furthermore, studies with subdermal laser also mentioned exclusion criteria for their experiments and/or clinical care, some of these conditions were selected as being contraindicated for using subdermal laser.

Following, we described the main contraindications for using subdermal laser, however we covered not only using 1470 nm laser (Endolift), but also other wavelengths, mainly the 980 nm laser (Endolaser).

In Table 1, it was listed the main contraindications for the use of endolift described by several studies, relating them with subdermal laser in specific aesthetic and therapeutic procedures.

**Table 1** Potential contraindications and exclusion criteria of published studies on the use of subdermal laser in treating aesthetic dysfunctions (Source: research data, 2024)

| **Contraindications** | **Authors** |
|---|---|
| Allergies to anesthetics and severe skin allergies | Nilforoushzadeh et al. [6]; Mordon et al. [13]; Castillo and Suárez [15]; Zerpa and Suárez [17]; Dias et al. [22]; DiBernardo et al. [38]; Leclére et al. [39]. |
| Hematological disorders (dyscrasias) and anticoagulant drug therapy | Quintero and Suárez [4]; Saran et al. [5]; Nilforoushzadeh et al. [6]; Castillo and Suárez [15]; Zerpa and Suárez [17]; Badin et al. [20]; Dias et al. [22]; DiBernardo et al. [38]; Leclére et al. [39]; Abdelaal and Aboelatta [40]; McBean and Catz [41]; Scrimali and Lomeo [42]; Heller et al. [43]; Matos [44]; Sasaki [45]; Benar and Benar [46]; Žgaljardić and Žgaljardić [47]; Centurión et al. [48]. |
| Local infections and active epidermal lesions | Nilforoushzadeh et al. [2]; Nilforoushzadeh et al. [7]; Castillo and Suárez [15]; Nilforoushzadeh et al. [16]; Zerpa and Suárez [17]; Sasaki [24]; DiBernardo et al. [38]; Scrimali and Lomeo [42]; Heller et al. [43]; Sasaki [45]; Hirokawa et al. [49]; Badin et al. [50]; Goldman et al. [51]; Ilaria et al. [52]; Advíncula et al. [53]; Borges et al. [54]. |
| Decompensated autoimmune systemic diseases | Quintero and Suárez [4]; Nilforoushzadeh et al. [6]; Li et al. [9]; Castillo and Suárez [15]; Badin et al. [20]; Dias et al. [22]; Sassaki [24]; Tagliolatto et al. [26]; Abdelaal and Aboelatta [40]; McBean and Katz [41]; Centurión et al. [48]; Hirokawa et al. [49]; Ilaria et al. [52]; Dornelles et al. [55]; Wolfenson et al. [56]; Bingol and Cinar [57]; Rocha et al. [58]; Simão [59]. |
| Pregnant and breastfeeding women | Nilforoushzadeh [2]; Nilforoushzadeh [6]; Zerpa and Suárez [17]; Dias et al [22]; DiBernardo et al [38]; Leclére et al [39]; Heller et al [43]; Sasaki [45]; Benar and Benar [46]; Hirokawa et al [49]; Ilaria et al [52]; Advíncula et al [53]; Dibernardo [60]; Dell'Avanzato [61]. |
| Collagen disorders and history of surgical complications | Dell'Avanzato [1]; Quintero and Suárez [4]; Mordon et al [13]; Castillo and Suárez [15]; Sasaki [24]; DiBernardo et al [38]; Leclére et al [39]; Abdelaal and Aboelata [40]; Sasaki [45]; Hirokawa et al [49]; Badin et al [50]; Advíncula et al [53]; Dornelles et al [55]; Bingol [57]; Simão [59]; Di Bernardo [60]; Gomes and Nicolau [62]; Kamamoto et al. [63]. |

| | |
|---|---|
| Obesity, large volumes of fat and extreme sagging skin | Mordon et al. [13]; Castillo and Suárez [15]; Tagliolatto et al. [21]; Tagliolatto et al. [26]; Scrimali and Lomeo [42]; Sasaki [45]; Žgaljardić and Žgaljardić [47]; Centurión et al. [48]; Dornelles et al. [55]; Wolfenson et al. [56]; Scrimali et al. [64]. |
| Liver and kidney dysfunctions | Mordon et al. [25]; Tagliolatto et al. [26]; McBean and Katz [41]; Prado et al. [65]; Reynaud et al. [66]. |
| Lymphedema or chronic peripheral arteriopathies | Hirokawa et al [49]; |
| Presence of fillers and/or biopolymers in the treatment area | Quintero and Suárez [4]; Dias et al [22]; |
| Psychiatric disorders | Tagliolatto et al [21]; Mordon [25]. |
| Sensitivity to laser treatment | Leclère et al. [39]; Aktas et al. [67]. |
| Cancer and previous radiotherapy in the area to be treated | Nilforoushzadeh et al. [2]; Quintero and Suárez [4]; Nilforoushzadeh et al. [6]; Nilforoushzadeh et al. [14]; Nilforoushzadeh et al. [34]; Wolfenson et al. [56]; |
| Severe solar elastosis | Advíncula et al. [53]. |
| Metal implant in the region to be treated | Advíncula et al. [53]. |
| High tobacco consumption | Sasaki [45] |
| Region with hair | Ibrahim et al. [10]. |

*3.5.1. Allergy to anesthetic substances (anaphylactic reactions)*

For endolift application, some authors highlighted the importance of anesthesia in the region to be treated [6, 7, 11, 14, 16]. Therefore, detailed anamnesis is essential to identify episodes of hypersensitivity or allergies related to the use of anesthetics once it is crucial to avoid anaphylactic reactions during the procedure, which can be fatal if there is no immediate and effective assistance [6, 17, 46, 52].

It is crucial to contraindicate the use of subdermal laser in patients with hypersensitivity or allergy to anesthetics [13,15, 22, 38, 39].

We also emphasize that cross-sensitization between different anesthetics may complicate clinical management. For instance, anesthetics from the ester group have an allergenic potential associated with para-aminobenzoic acid, which can cause reactions in patients with a history of allergy to similar substances, such as parabens [69,70]. The administration of amid anesthetics such as lidocaine to allergic individuals may result in adverse reactions due to the presence of meta-xylenes, a component that may be present in other medications that the patient would be taking [69]. Therefore, careful assessment and adequate planning are essential to ensure patient safety during endolift procedure, especially in cases of known hypersensitivity to local anesthetics or reactions with medications commonly used at the time of treatment.

Regarding the type of anesthetic applied, although articaine is commonly used in dental procedures through the application of intraosseous and intraligamentary infiltration, it is also possible to use it for local anesthesia in surgical procedures. subdermal laser such as Endolift. It demonstrates its ability to reach areas hard to get anesthesia [71].

However, the use of articaine in higher concentrations (4%) is associated with risks such as loss of sensation in the anesthetized area (paresthesia) and local side effects, like bruising and edema. Many reports indicate that articaine is responsible for a significant proportion of cases with non-surgical paresthesia [72]. Therefore, it is essential to use it with caution in Endolift, taking these potential risks into account.

It is also important to highlight that Tumescent Local Anesthesia (TLA) reestablished the practice of liposuction, being widely associated with Klein's solution [73-76], which is also extensively used in aesthetic endolaser procedures in Brazil. This anesthetic approach allows procedures to be carried out without needing general anesthesia, providing

greater safety and reduced risks for patients. In the case of subdermal laser, Klein's solution (modified or not) plays a crucial role in anesthetizing the treated area, ensuring both patient comfort and the effectiveness of the procedure [17].

It is recommended for the safe subdermal laser application, in addition to carrying out a detailed anamnesis and continuous patient's follow up during and after the procedure, it is essential that the professional is adequately trained, has specialized knowledge, knows how to diagnose and manage possible anaphylactic complications. However, it is possible to perform the subdermal laser without the using anesthetics. Zimmer and Borges [77] described their extensive experience in Brazil with the use of the endolaser without using anesthetics, where they obtained excellent therapeutic results without any type of allergic or anaphylactic complications.

*3.5.2. Hematological, vascular disorders and anticoagulant drug therapy.*

During the Endolift procedure, a microcannula is normally used to inject the anesthetic under the skin, then the optical fiber is introduced in the same location and path as the anesthetic for laser emission. The process involves retroinjection movements and back and forth movements with the optical fiber in the subcutaneous tissue [54, 78]. Furthermore, the optical fiber might also be inserted inside a cannula to facilitate and direct its movements, and this approach can further arise mechanical trauma due to cannula's action when it is moved within the subcutaneous tissues [54].

Thus, the traumatic nature of these instruments on blood vessels might generate intense blood spillage for long periods resulting in significant hemorrhages and hematomas (Figure 1), therefore, blood dyscrasias and a history of using antiplatelet or anticoagulant drugs can constitute an impediment to the use of subdermal laser [4-6, 15, 17, 20, 38-47]. It is because the recovery of these patients tends to be slower, which would increase the risk of complications in local tissue repair, as well as in the resolution of the inflammatory process.

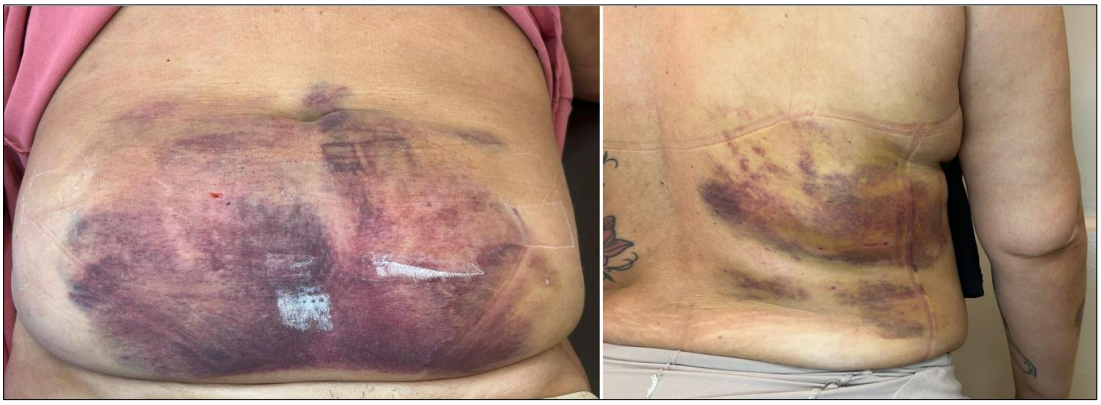

**Figure 1** Intense post-endolaser hematoma (1470 nm) caused by mechanical trauma with the use of microcannulas when injecting anesthetic solution and aggravated by the passage of the optical fiber (600 microns) for laser emission

Therefore, patients with blood dyscrasias represent a clinical challenge during or after procedures. These disorders may be hereditary (congenital) or acquired. Among the hereditary disorders, the most common involve abnormalities in clotting factors, with hemophilia being the most common congenital disorder. Another hereditary condition is hereditary hemorrhagic telangiectasia, characterized by spontaneous bleeding because the blood vessels are more fragile. Acquired diseases include thrombocytopenia and some kidney conditions [44].

Therefore, blood dyscrasias can increase the risk of complications during and after the subdermal laser procedure, making it a contraindication for the use of this laser procedure [48].

It is also important to highlight that many patients with coagulation disorders can use anticoagulants, such as vitamin K antagonists, to prevent blood clots and ischemic events [44]. However, some medications indicated for this condition as warfarin, clopidogrel (bisulfate), aspirin and non-steroidal anti-inflammatory drugs, are contraindicated for the practice of subdermal laser. It is also important to avoid medications that inhibit hepatic cytochrome P450 enzymes, such as selective serotonin reuptake inhibitors and azole antifungal agents, as these can interfere with the metabolism of lidocaine [41]. Furthermore, the recent use of immunosuppressants, vitamin E, anti-inflammatory therapy and prolonged use of steroids also contraindicate the use of subdermal laser [45] since they can generate persistent hemorrhagic conditions after the procedure.

Given this scenario, it is essential to carry out a good assessment before the procedure, considering the patient's medical history and the risk factors associated with blood dyscrasias. Laboratory tests such as platelet count and coagulation testing may be necessary to determine the patient's health status [4].

*3.5.3. Local infections and active epidermal lesions*

The contraindication of Endolift in cases of local infections is justified by the risk of worsening inflammation during the procedure [2, 7, 16, 38, 42, 43, 45, 49-52], since the heat generated can intensify the infectious process, increasing the spread of pathogens to adjacent tissues and impairing healing [24].

Likewise, the use of Endolift in patients with active epidermal lesions is contraindicated due to the risk of worsening pre-existing conditions. The heat generated by the laser can increase inflammation, increase the risk of infection and compromise healing, since the skin barrier is already compromised [2, 15-17, 53]. To ensure safe treatment, it is essential to treat epidermal lesions before carrying out the procedure.

*3.5.4. Decompensated systemic and autoimmune diseases*

The use of Endolift is contraindicated for patients with uncontrolled systemic diseases, such as diabetes, hypertension and cardiovascular diseases [4, 9, 20, 24, 26, 37, 40, 41, 52, 58, 59]. Under these conditions, the risks of intra and post-procedural complications are high, including poor healing, bleeding and cardiac complications [6, 45, 55, 56]. Furthermore, patients with morbid obesity often associated with diabetes and hypertension, are at increased risk of vascular, infectious and scarring complications [48].

Particularly, diabetes can significantly influence the safety and effectiveness of procedures in aesthetic medicine, such as the use of subdermal lasers, which have specific contraindications for patients with chronic diseases. These impacts can be observed in different aspects. People with diabetes often experience xerosis, characterized by dry skin, which compromises the skin texture and appearance, impacting the preparation and results of aesthetic procedures [79]. Furthermore, a compromised immune system increases susceptibility to infections, especially after invasive procedures, and increases the risks of poor healing and inadequate immune response [15]. Therefore, it is essential to ensure rigor in hygiene care and post-procedure monitoring to minimize these risks [80].

Another important aspect is the impairment of wound healing in diabetic patients, which can interfere with procedures that involve incisions, injections or manipulations on the skin, increasing the risk of complications and harming the final results. Diabetes also affects collagen metabolism, reducing the elasticity and structural integrity of the skin, impacting the long-term results of procedures such as dermal fillers, which rely on collagen for good results [80].

Patients with autoimmune diseases such as systemic lupus erythematosus and rheumatoid arthritis, also require special attention. These conditions can exacerbate the inflammatory response, triggering adverse immunological reactions after using laser technologies and affecting the predictability of healing [81].

*3.5.5. Pregnancy and lactation*

Several studies indicate contraindications for the use of laser in pregnant and breastfeeding women due to possible risks to maternal health and the baby's development [2]. Pregnant women have been systematically excluded from many studies, as the safety of the laser during pregnancy has not yet been established, and the procedure can bring risks to both the mother and the fetus. Similarly, several studies [6, 16, 17, 22, 38, 39, 43, 45, 46, 52, 53, 61] adopted criteria that exclude pregnant and lactating women from their analyses. Furthermore, another study [60] applied criteria that also exclude patients who have undergone recent abdominal surgery, aiming to reduce possible complications related to healing and recovery.

In more comprehensive cases, some research [49] expanded the exclusions to patients who are pregnant, potentially pregnant or using contraceptives, considering possible interactions between hormonal treatments and the laser procedure.

It is important to highlight that anesthesia during pregnancy, especially in the first trimester, may be associated with a 1% risk of congenital malformations [82]. For breastfeeding women, although Endolift is a localized procedure, the contraindication is justified by the inflammatory response and the heat generated, in addition to the use of anesthetics.

Despite this, a study on dental anesthesia in pregnant and lactating women [83] indicated that the use of lidocaine is permitted during pregnancy, while mepivacaine and bupivacaine should be administered with caution. According to the

study, these anesthetics do not bring any risk to the fetus in the first trimester and there is no evidence of danger in subsequent trimesters, with the possibility of fetal harm considered remote. During the lactation period, these anesthetics do not cause changes in breast milk.

*3.5.6. Collagen disorders and history of surgical complications*

Patients with collagen disorders face a greater risk of adverse reactions from procedures that use heat, such as the Endolift. Studies indicate that excess collagen may result in hypertrophic scars or keloids, highlighting that individuals with these disorders tend to present abnormal scarring when exposed to heat, which could compromise tissue integrity [84]. This is reinforced by previous research that has linked collagen disorders to inadequate healing during thermal procedures (4, 24, 39, 45].

Additionally, individuals with a history of surgical complications such as infections and irregular scars, are more likely to develop additional problems while using the Endolift. This predisposition is attributed to the worsening of inflammation and the impairment of the healing process, which increases the vulnerability of the treated tissues [49]. Other studies also point to this risk highlighting the need for careful evaluation in patients with a history of complications [1, 15, 24, 38, 40, 53, 55, 57, 59, 60, 62, 63].

Tissue response to heat can be unpredictable in patients with healing problems, which can result in inadequate healing or abnormal scar formation [13]. Furthermore, the risk of infections and unfavorable scars in these cases requires careful assessment to identify patients more susceptible to these complications [50].

*3.5.7. Obesity, large volumes of fat and extreme sagging of the skin*

Applicating endolaser is contraindicated in patients with morbid obesity due to the increased risk of complications during the procedure [15, 45]. Furthermore, removing large amounts of fat may be less effective as thermal energy tends not to be evenly distributed, resulting in incomplete fat reduction and difficulties in skin retraction [21]. This condition also prolongs the time of laser exposure, increasing the risk of burns, inadequate healing and seroma formation [55].

Patients with large volumes of fat and extreme skin flaccidity or severe skin ptosis (post-bariatric surgery patients, for example) face significant limitations in obtaining satisfactory results with Endolift, as they may not achieve the expected aesthetic result, especially if the technique is applied without correct planning [13, 21, 42, 47, 48, 55, 64].

Although it is an effective technique for reducing localized fat and mild to moderate skin retraction, subdermal laser has important limitations in cases of morbid obesity and excess flaccidity [26]. For these patients, a detailed prior assessment and strategic planning are essential to minimize risks and avoid unsatisfactory aesthetic outcomes (Figure 2), and it may be necessary to consider complementary surgical alternatives to optimize results.

**Figure 2** Patient with localized abdominal fat and excess skin in the infraumbilical region. Was treated with a subdermal laser session (1470nm) throughout the abdomen without satisfactory results for skin retraction, although a reduction in subcutaneous fat in the supraumbilical region was achieved. She was advised to undergo abdominoplasty to correct excess skin

*3.5.8. Liver and Kidney Dysfunctions*

The use of Endolift is contraindicated for patients with liver and kidney dysfunction, considering that these conditions may increase the risk of compromising the functions of these organs.

Therefore, insufficiency in these organs is recognized as an exclusion criterion as it increases the probability of adverse effects during and after the subdermal laser procedure [66]. According to some authors [65], the laser-assisted lipolysis procedure particularly presents additional risks once it can release free fatty acids into the circulation, which could overload liver and kidney functions potentiating toxicity, thus representing a significant risk for patients with pre-existing dysfunctions. However, Mordon et al. [25] demonstrated that after lipolysis using a subdermal laser (980nm), serum cholesterol and triglyceride levels remained normal. The understanding is that fat elimination is so gradual that an increase in circulating lipid levels is not measurable. Tagliolatto et al. [26] reported that even if there is liquefaction of adipose tissue after the laser, there is no increase in serum cholesterol and triglyceride levels due to a possible local collapse of blood and lymphatic vessels, making the absorption of free fatty acids difficult.

Despite the discussion between these published reports, there is an understanding that patients with liver dysfunction may face higher risks of toxicity, especially in the context of the use of local anesthetics and other substances from the procedure, which can accumulate and lead to serious side effects [41], in addition to having limitations in metabolizing substances produced or released during the subdermal laser procedure. The exclusion of patients with liver diseases from some studies stands out as essential to ensure safety, given that the efficacy and safety of the procedure depends on the stability of liver and kidney function [26].

*3.5.9. Lymphedema or chronic peripheral arterial disease*

Patients with lymphedema should not expose the affected area to heat treatments of any kind [85]. In this context, the subdermal laser is contraindicated for these individuals as this equipment reaches high temperatures.

Chronic peripheral arterial disease (PAD) is a vascular condition characterized by narrowing and blockage of arteries mainly due to atherosclerosis, which restricts blood flow and hinders tissue healing processes [86]. Therefore, it is understood that the subdermal laser is not indicated for these patients.

*3.5.10. Presence of fillers and biopolymers in the treatment area*

The use of dermal fillers to treat facial sagging, volume loss and wrinkles has become increasingly popular among patients of different ages and ethnicities. These materials are widely used to add volume, improve contours and smooth expression lines [87], but the combination with laser technologies requires caution.

A case study, in which the patient used the fractional $CO^2$ laser 5 days after applying hyaluronic acid resulted in edema, erythema and blackened crusts with exudate, and this possibly occurred because the high energy emitted by the laser caused dehydration of the acid hyaluronic [88].

Similarly, the use of the subdermal laser also reaches high temperatures. On the skin's surface o, it normally does not exceed 40°C, however studies have mentioned that the skin can reach borderline temperatures of 41°C and 42°C and internally the temperature is even higher [78]. Therefore, Endolift may be contraindicated in patients who already have hyaluronic acid, as the interaction between the laser and fillers may generate adverse reactions or compromise previously achieved aesthetic results.

The loss of hyaluronic acid can also be observed in aesthetic technologies that generate heat, such as focused ultrasound. Studies suggest that these procedures can influence the ideal interval between sessions in the same area, affecting the effectiveness of treatments [89].

The problem is even more delicate when regarding polymethylmethacrylate (PMMA), a permanent filler. Unlike hyaluronic acid, which is resorbable, PMMA remains in tissues long-term [90].

The study on femtosecond laser ablation on PMMA surfaces highlights important considerations. Research has demonstrated that laser irradiation can change the morphology and chemical properties of PMMA resulting in a change in wettability behavior and the formation of porosity on the polymer surface [91]. Therefore, when considering the use of the Endolift in patients with PMMA fillers, it is crucial to keep in mind the risks associated with the interaction between the laser energy and the filler material, which can impact on desired aesthetic results, highlighting the need for a careful assessment before the procedure.

Regarding PDO threads, although they are absorbable over time, the thermal energy emitted by technologies such as focused ultrasound can accelerate this absorption, compromising the durability of the support effect that the threads offer. Authors [92] recommended using microfocused ultrasound before implanting PDO wires.

Agreeing with these fundamentals, some authors do not recommend the use of subdermal laser in patients with permanent and semi-permanent fillers [4, 22].

*3.5.11. Psychiatric disorders*

In aesthetic surgery consultations, up to 47.7% of patients may present some type of mental disorder, with emphasis on body dysmorphic disorder (BDD), narcissistic personality disorder and histrionic personality disorder. Recognizing psychiatric signs in these patients such as frequent complaints about past procedures, lack of adherence to guidelines, or disproportionate expectations helps professionals to deal with more complex cases and improve outcomes, as well as reducing the risk of lawsuits [93]. Therefore, authors [21,25] recommended strict criteria in the selection of candidate patients for the use of subdermal laser in order to contraindicate care for patients who present any level of symptoms related to a psychiatric disorder.

*3.5.12. Sensitivity to laser treatment*

The dose of energy emitted by the subdermal laser must be adjusted to the patient's smaller, more sensitive areas, such as the face. Also, to larger and more resistant areas, such as the body, to ensure the procedure is safe and effective [94]. Despite this caution, patients with a clinical history of sensitivity to laser or intense pulsed light treatment were considered exclusion criteria in studies on subdermal laser [39,67].

*3.5.13. Cancer and radiotherapy prior to treatment*

Laboratory studies have indicated that low-level laser therapy (LLLT) can increase the proliferation of certain tumor cells under specific conditions [95]. In this sense, the concern with the use of high-power lasers in patients with a history or risk of cancer is related to the possibility of stimulating remaining or undetectable tumor cells around the treated area.

Therefore, cancer patients are contraindicated for treatment using subdermal laser according to some authors [2, 4, 6, 14, 34, 56].

Furthermore, patients who undergo radiotherapy as a treatment for cancer are also contraindicated for the use of subdermal laser [4]. This is justified by the fragility of these patients' skin, as 95% of individuals with cancer undergoing radiotherapy have cutaneous side effects. This occurs due to cellular damage caused by interruption of the cell regeneration cycle by radiation. Symptoms include peeling and pain, which can impact quality of life [96].

*3.5.14. Severe solar elastosis*

Severe solar elastosis was considered a contraindication for Endolift [53]. It represents a profound degeneration of collagen and elastin fibers caused by chronic exposure to the sun, which results in extremely fragile skin, with a marked loss of elasticity and structural integrity [97]. Therefore, it is possible to understand that the heat from the laser can increase the risk of complications in fragile skin, besides not producing the necessary amount of collagen, due to changes in its physiology, and thus not generating the desired aesthetic result.

*3.5.15. Metal implant in the region to be treated*

Authors [53] mentioned metallic implants as contraindicated for Endolift, but did not justify such a restriction. We did not find elucidating reports about this situation, as we question the fact that the metal does not have chromophores that absorb the typical wavelengths of Endolift (1470nm) and/or Endolaser (1470nm or 980nm), however we understand the high light reflection power of some metals, which could generate heating in tissues surrounding the implant, producing injuries in tissues that are not the target of treatment. Therefore, we consider this contraindication to be highly relative.

*3.5.16. High tobacco consumption*

It is known that nicotine and other substances present in cigarettes compromise blood circulation, which impairs the skin's ability to heal and regenerate [98]. Therefore, high tobacco consumption was considered a contraindication for the use of subdermal laser [45], given the possibility of post-procedure complications regarding healing of the treated site.

*3.5.17. Region with hair*

Authors [10] compared the use of 1470nm, 980nm subdermal laser and botulinum toxin for the treatment of axillary hyperhidrosis. The best result in reducing axillary sweating was obtained with the 1470nm wavelength, however, after the study, a decrease in hair growth was observed in the 980nm (50%) and 1470nm (83.3%) laser groups. This study justifies the contraindication of Endolift in regions with excess hair, as the intense heating of the dermis may affect the physiology of the hair follicles, resulting in the absence of hair growth. In figure 3 it is possible to notice a case of using the subdermal laser on the face (1470nm) where there was capillary rarefaction in some points of the beard.

**Figure 3** Adverse effect of specific hair thinning on the beard in the submental region after using the 1470nm subdermal laser (Kindly provided by Vânia Medeiros – Distrito Federal-DF, Brazil)

## 4. Conclusion

This research highlighted the importance of considering contraindications for using subdermal laser in aesthetic procedures. The analyzed studies highlighted that, although endolift is an effective and minimally invasive technique, its application is not riskless. Among the contraindications identified, conditions such as allergies to anesthetics, blood dyscrasias, vascular disorders, use of anticoagulants, presence of biopolymers in the area to be treated, history of abnormal scarring (such as keloids), in addition to active epidermal lesions and decompensated autoimmune diseases. These conditions can compromise aesthetic results, and also put patient safety at risk during and after the procedure.

We conclude that acknowledging contraindications of using Endolift (Endolaser) is crucial for patient safety and treatment effectiveness and therefore, the careful evaluation of the patient's clinical history and the performance of pre-procedural exams are important and, perhaps, necessary to minimize possible complications associated with the restrictions imposed by such contraindications, therefore, the careful selection of candidates for the application of Endolift must be a priority, ensuring that those with recognized contraindications are excluded from treatment in order to protect their health

## Compliance with ethical standards

*Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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