

Guidelines of Care for Laser-Assisted Liposuction using 1064nm Nd-YAG laser

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Summary

The text represents a summary of the experience collected by the author and associated colleagues who have been using the Laser-Assisted Liposuction technique over the last 7 years. As any new technical innovation or drug in medicine, future studies can change treatment outcomes, clinical indications and technical protocols and parameters. It is important to note that good common sense, the right expectations and clinical experience are required in order to obtain safe and effective results using Laser-Assisted Liposuction. The following information contains and represents the author's suggestions and should be taken into consideration in accordance with each physician's preference and experience. The aim of these guidelines is to present general information of Laser-assisted Liposuction for educational purposes. Please note that adherence to these guidelines will not ensure successful treatment in every situation. The Guidelines are not intended to be all-inclusive or absolute.

Purpose

These guidelines were designed to provide guidance and safe performance levels, protocols and parameters of Laser-Assisted Liposuction.

Definition of Terms

Laser-assisted Liposuction using a 1064nm Nd:YAG laser is a surgical procedure based on the disruption of adipocytes by a specific laser. Two main effects are involved with cellular lysis: thermal effect and photo-mechanical effect. Specific to this procedure, the laser energy is delivered to the subcutaneous tissue through a fiber optic with a 1 mm cannula at the end of the fiber. The composition of the cellular lysis is usually removed using negative pressure of around 350mmHg to 450mmHg in conjunction with a 2.5mm suction cannula. Laser lipolysis allows for the coagulation of small blood vessels in fatty tissue in addition to the reorganization of the reticular dermis and coagulation of collagen in the subcutaneous fat layer. Synonyms and related words include laser lipolysis, laser-liposuction surgery, laser-assisted lipectomy, laser lipoplasty and laser liposculpture.

Tumescent liposuction

By using small aspiration cannulas a subcutaneous infiltration of high volumes of crystalloid fluid containing low concentrations of lidocaine and epinephrine are followed by suction-assisted aspiration of fat. It is one of many different methods for performing laser-assisted liposuction. The physician must choose the method of anesthesia as well as the total volume infiltration according to his personal experience. Laser-Assisted Liposuction can be performed using a tumescent anesthesia or other methods thereof. The infiltrated volume can vary according to each patient and to surgeon's preference.

Guidelines

Physician Qualifications

Laser-Assisted Liposuction is a surgical procedure. The physician must have reasonable knowledge and experience in general and cutaneous surgery, liposuction, drugs toxicity, anatomy, surgical metabolism, fluid and electrolyte balance, potential complications of liposuction, tumescent anesthesia and other forms of anesthesia employed.

Laser products and their interactions with tissues and specific chromophores must also be considered. The qualifications will vary according to each country and/or state regulations. The physician must be trained in a professional center and preferably be certified to conduct Laser-Assisted Lipoplasty procedures.

Facility Considerations and Medical Emergency Care

Laser-Assisted Liposuction can be performed in a physician's office surgical facility, an ambulatory surgical facility, or a hospital operating room. Facility operations and the medical team must determine an adequate plan for management of medical emergencies. Please ensure that the emergency plan includes proper transfer to other facilities if necessary. Also, please note to document all informed consents which must be obtained prior to surgery.

Pre-Operative Patient Evaluation

Medical and psychosocial evaluation plays a fundamental role to the success and safety of each Laser-Assisted Liposuction treatment. Physical evaluation includes assessment of the general physical health. A documented medical history, physical examination, and appropriate laboratory work based upon the patient's general health and age must be performed on all candidates.

Laser-Assisted Liposuction is contraindicated in patients who are pregnant, patients with severe cardiovascular disease or with severe coagulation disorders including thrombophilia. The patient's medical history must ensure special attention to any history of bleeding disorders, emboli, thrombophlebitis, infectious diseases, previous surgical procedures, poor wound healing and metabolic diseases.

Medications that affect blood clotting (e.g. aspirin, nonsteroidal anti-inflammatory agents, Vitamin E, anticoagulants, Ginko Biloba) must be interrupted days or weeks pre and post surgery.

Psychosocial evaluation and patient's expectations are also important factors to consider. Laboratory studies must be taken (blood count with quantitative platelet assessment, prothrombin time, partial thromboplastin time and chemistry profile including liver function tests) prior to any surgery.

Clinical examination should include a planning and evaluation of all regions being treated including the presence of hernias, scars, asymmetries, cellulite, and stretch marks. The quality and texture of the skin and, particularly, its elasticity or the presence of flaccidity must also be evaluated.

Finally, standardized and consistent photographic documentation is required for all patients.

Anesthesia, Sedatives, and Analgesics

All modalities of anesthesia can be used in Laser-Assisted Liposuction but it is important to call out the authors' preference for local anesthesia (e.g. Klein's or a similar solution). In our experience more than 95% of the procedures are performed under local anesthesia. Depending on the patient or type of treatment, the presence of the anesthesiologist may be necessary. Lidocaine with epinephrine is the preferred choice of local anesthesia. In order to prevent side-effects, it is always important to be prudent with the use of different kinds of drugs or formulations, by observing their toxicity and dosage.

Indications

The main indication for laser-assisted liposuction is the removal of localized fat (lipodistrophy). This lipoplasty technique is indicated to patients with normal body weight and with realistic expectations for treatment outcomes. It is important to point out that Laser-Assisted Liposuction is not indicated for the treatment of obesity.

In selected patients, mainly in the treatment of larger areas, the surgery can be performed in combination with the use of traditional liposuction tools. This option should be properly diagnosed and discussed between the physician and patient. Appropriate and conservative sedation techniques can be used before and during the procedure. Additionally, adequate analgesics can be prescribed post surgery. The dose of each drug must be carefully evaluated in order to avoid toxicity or undesirable reactions.

Surgical Technique

Laser-Assisted Liposuction procedures are performed after subcutaneous infiltration of a Klein's solution or a similar solution containing normal saline, epinephrine and Sodium Bicarbonate. The total volume of the infiltration will vary according to the treated area and surgeon preference.

The procedure is initiated following a fifteen to twenty minute delay, allowing for diffusion of the anesthesia and appropriate vasoconstriction. The author suggests the use of a warm fluid infiltration. In doing so, it is possible to avoid the pain produced by the difference in temperature between the fat tissue and the infiltration. Practically all procedures can be performed using local anesthesia with or without the presence of an anesthesiologist.

The laser system used is a pulsed 1064nm Nd:YAG system (SmartLipo®). The system provides ultra short pulses and has extremely high peak powers. In this procedure, the laser energy is delivered to the subcutaneous tissue through a 300-micron fiber optic with a 1mm diameter stainless steel micro-cannula of variable length connected to the tip of the fiber. A 6W, 100µs pulsed laser at 40Hz and 150mJ was used for the treatment of most anatomical regions. A 10W equipment can also be used. In the treatment of small or very superficial areas, the power and/or the laser action time can be decreased.

The distal portion of the fiber optic is extended 2mm beyond the distal end of the cannula. For visualization purposes, a He:Ne laser source is combined into the beam path providing the precise location where the laser is working through the trans-illumination effect.

A 1mm incision is sufficient to introduce the cannula. Insure that the laser is not activated while introducing it into the incision to avoid skin lesions. Once inserted, the laser can be activated and then moved slowly with consistent motion techniques in the fat tissue at various depths, including the sub-dermal layer, similarly to the superficial liposuction approach.

In the author's practice, associated procedures are often avoided. In isolated and selected cases, some minor associations can be performed.

Treatment Areas

Laser-Assisted Liposuction can be used in several areas of the body and face, including the mandibular border, submental region, breasts, upper and lower abdomen, back, flanks, hips, love handles, pubic area, inner and outer thighs, buttocks, knees or ankles. Do remember that in selected cases the power and/or /time can be decreased.

Clinical Endpoint

Laser-Assisted Liposuction is delivered over a varying length of time and total accumulated energy. When deciding the endpoint, several factors are to be considered such as the size of the area to be treated, the accumulated energy, resistance, and the pinch test.

Aspiration

The product of the cellular lysis is usually removed using negative pressure of around 350mmHg to 450mmHg in conjunction with a 2.5mm or 3mm suction cannula. The author recommends using syringes, pumps or aspirators. It is not necessary to use sutures for the small incisions, thereby allowing for a natural drainage of the infiltrated solution, blood and the oily solution produced by the laser action.

The recommended cannula size for liposuction is generally no larger than 3mm in diameter. According to the Federal Board of Medicine and to the Brazilian Society of Plastic Surgery, the appropriate volume of tissue removal must be no more than 5 or 7 percent of the patient's total body weight.

There is no doubt that the tumescent solution allows a safe treatment of large areas. Recommended dosage for tumescent lidocaine should be carefully observed and not exceeded.

In the author's experience, the length of time of the procedure rarely exceeds 3 hours. Laser-assisted liposuction may be commonly performed on an ambulatory basis. The procedure must be performed using sterile technique.

Intra and Post-Operative Recommendations

Vital signs, including blood pressure, pulse oximetry and heart rate, are to be recorded pre and post-operatively. Additionally, the use of supplemental oxygen and sedatives must be evaluated in each case. Sedated patients must be monitored during the post-operative period until fully recovered.

Laser-Assisted Liposuction is an outpatient procedure and after the first post-operative day the patient gradually returns to normal daily activities, with minimal discomfort. In the author's experience, a smooth compression can be used from seven to ten days.

It is not recommended to use strong garment compression, which can produce a decrease in lymphatic drainage and can be uncomfortable for the patient. Smooth compression garments,

binders and tape are usually effective and can help reduce bruising, hematomas, seromas, and pain.

Prophylactic antibiotic therapy is not necessary and is only indicated in special cases. Early ambulation of patients is advisable to avoid venous stasis in addition to shortening the post-operative recuperation period.

Results/Treatment Outcomes

The results will vary according to each patient. Outcome expectations should be based on a preoperative evaluation of the patient's age, skin texture, elasticity and amount of treated fat desired for removal. Best results are seen in younger patients with average weight and tissue elasticity. Typically patients will see 80% of their results within the first four months.

Complications and Side Effects

Laser-Assisted liposuction is a safe and effective procedure. Despite this fact, all potential complications and side-effects that can be observed in traditional lipoplasty techniques can also be observed with this technique. Therefore, any complications such as infections or seromas should be treated with standard practice including antibiotic therapy and close monitoring of the patient.

General Information + Recommendations

- 1) As any new surgical or medical treatment, be conservative in one's initial procedures.
- 2) When operating on small areas, mainly in the face or very superficial areas, decrease the power or the time you will work with the laser.
- 3) Check before and during each procedure to ensure that the distal part of the fiber is not burned. If the fiber is burned or even if it lost its yellow coloration, cut 1 or 2mm before using.
- 4) Be cautious of alcoholic solutions on the skin.
- 5) Laser-Assisted Liposuction provides skin tightening results. The intensity of this improvement depends on each patient.
- 6) Maintain continuous motion with the cannula to avoid burning or other adverse effects.
- 7) Make sure the laser is turned "OFF" before the initial introduction in the tissue.
- 8) Working in different depths of the fatty tissue will enhance results of cellular disruption and skin retraction.
- 9) The motion technique with the cannula should be smooth, uniform and uninterrupted. It is not necessary to move the cannula quickly.
- 10) The laser itself will facilitate penetration of the cannula into the tissue, mainly in secondary procedures and fibrous tissue.
- 11) Make sure to carefully evaluate the placement of skin incisions prior to surgery.
- 12) 1mm or 2mm incisions can be made with an 18G needle.
- 13) If possible, avoid suturing the incisions.
- 14) A written protocol of pre and post care is recommended.
- 15) It is recommended to discuss all patient expectations and limitations prior to the surgery.
- 16) Be sure to have a high quality photographic documentation.
- 17) All medical staff and patients must use protective glasses. Confirm "Warning" signs are posted on the front door of each Laser treatment room.
- 18) Avoid fiber damage by using proper technique and smooth cannula motion.
- 19) It is important to evaluate the regions to be treated, observing irregularities, depressed areas or important asymmetries.
- 20) Laser-assisted Liposuction using a 1064nm Nd:YAG laser can be used as an isolated procedure or in association with other techniques.
- 21) Laser-assisted liposuction has the same indications as any kind of lipoplasty.

It is important to note that these recommendations are not absolute. The Laser-Assisted Liposuction technique can be adapted according to each surgeon's experience in order to optimize results.

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