

Evaluation of Laser Assisted Lipolysis in Facial and Body Contouring by MedArt SmartSculpt Diode Laser 980 nm



Laser assisted lipolysis is a minimal invasive method to treat unwanted localized adiposities by laser thermolysis and inducing collagen neogenesis through stimulating skin fibroblasts. The final outcome is skin tightening and area re-contouring. A very efficient method with a quite short downtime.

Face and body contouring and rejuvenation is becoming increasingly popular for individuals in their 40's and older. As surgery one of the mainstays of treatment modalities, however in the new and modern life style many individuals choose a modality with no or minimal invasiveness and as well with very short recovery time.

By minimally invasive and non-surgical methods may one decrease both local and general side effects and even decrease the risk of unwanted permanent results.

Different face and body areas can be treated
In following report, we have focused on face and neck areas mainly the contour and fullness of lower cheek, jaw-line, submental and cervical regions and as well lower abdomen, flank, chest and upper arm. One case of histologically verified Lipoma is also treated.



Principal of treatment:

After a local anesthesia by use of Tumescent, the Laser Lipolysis melts the fat which can be subsequently aspirated by liposuction or just eliminated physiologically.

The main target of the treatment remains:

- Localized adiposity
- Skin laxity

Inclusion condition:



- A pinch test of approximately 3-4 cm which indicates moderate lipomatosis. (Not Obesity solution)
- Moderate elasticity of skin in a stretch test $\leq 30\%$.
- 18 healthy patients totally treated on face and abdomen area, 11 female and 7 males between ages 40 - 72.
- Patients were excluded if they had any major systemic or immune disease or any localized conditions which would affect the treated areas.
- Any patients with body mass index over 30 were also excluded.

Procedure advantages:

- Minimal invasive
- Local anesthesia (Tumescent)
- Short down time, short convalescence period
- Areas in which visible scars should be avoided
- The thermal laser effect causes coagulation of the blood vessels leading to less blood loss and bruising therefore resulting in a shorter recovery period.
- All the procedure performs through couple of minimal incisions as entry points through the skin.



Following patient selection and identification of the treatment area, patient education and consent, the selected area is examined:

- Pinch & Stretch test
- Photo documentation
- Anatomical consideration "puncture zones"
- Disinfection of the skin
- Area are marked with a sterile waterproof marker

The procedure performs in 2-3 steps

The first two steps are obligatory, and the third step can add depending on individual case and can be complementary.

1. Tumescent anesthesia

After preparing the patient and local disinfection of the area and wearing sterile clothing, a mixture of prepared Tumescent is injected by the help of Tumescent pump, which facilitate the prompt infiltration of the selected region.

Tumescent: Mixture of Xylocaine 1%, Adrenaline and Sodium Bicarbonate 8.4% in NaCl 0.9 ml solution.

Infiltration amount: Approx. 50 ml per 50 cm² of area treated.

The Tumescent maximize safety by subcutaneous infiltration of large volume of diluted anesthetic solution to cause the targeted areas to be swollen and firm, permitting to perform a safe laser lipolysis without compromising the underneath anatomical structure and even though low risk of reaching toxic levels of drug in the blood stream while achieving an extensive regional anesthesia.

2. Laser treatment

MedArt SmartSculpt 980nm wavelength, Output 25W continuous wave using a 600µm fiber-optical wave-guide with coating and approx. 3 m long.

Laser settings depends on the treated area 12-15W cw or pulsed option.

For a roughly one palm-sized area (approx. 50 cm²), about 1000 to 1500 joules are applied.



Laser delivers energy in form of heat to the tissue via an optical fiber within the cannula. The heat is absorbed by adipocytes resulting in damage and rupture of the cell membranes, produce as a final result a liquefying fat which can be either absorbed physiologically or aspirated by a simple suction method.

The cavity expansion of the Tumescent solution eases the procedure decreasing risk of damaging underlying anatomical elements and spreading even the laser thermal effect and decreasing risks of thermal burn.

The visible red-light beam enhancing the procedure trans-illuminating the skin, allowing to choose the adequate treatment depth for thermal lipolysis of both subcutaneous fat while running in the deeper level and tightening of the skin while treating just beneath the skin.

The fiber inserted in subcutaneous cavity and the laser pulse is triggered by pedal activation. As long as the foot pedal is pressed an audible signal is heard and laser energy as thermolysis is released.

It is important during this period to withdraw the fiber at an even speed of about 0.5-1 cm per second to distribute a homogenous energy to all the area.

It is vital as closer to the entry site we get, to decrease the withdrawal speed in order not to emit high energy to the tissue a rounding the entry site. In this way we perform an even energy distribution to treatment site and as well decreases the risks of thermal burn to the entry site adjacent tissue.

The treatment is carried out in a fan-shaped pattern having in mind to stop the energy release about 1 cm close to the entry point.



Important consideration:

If the intention of the treatment is both lipolysis and skin tightening, then the treatment must perform in two depth:

In the first stage must perform in deeper subcutaneous fat layer which in that case the aiming red light is not so clear and somewhat hazy but still visible. And the next step must run the fiber optic just subcutaneously adjacent to the skin, while visibility of the red aiming beam is much better. And as a result we distribute more energy to skin itself inducing collagen remodeling and as a result skin tightening.

One must keep in consideration the deeper the fiber is in subcutaneous cavity and the more energy that is applied here, the higher the risk of getting close to underlying anatomical element as arteries, veins and nerves.

The higher the tip of the fiber when energy is applied towards the skin, then the higher risk of dermal/epidermal thermal damage and scarring.

It's important to control the average temperature of the treated area by constantly feeling the warmth of the skin with the other hand while performing the laser.



3. The lipo-aspiration

By help of liposuction the rest of the lysed fat can be aspirated gently together with the remaining tumescent solution without need of any vigorous and long liposuction procedure.

This step is not obligatory but just complementary, we can individualize the treatment depending on the case and region.

A major benefit of laser lipolysis procedure is that it is less traumatic to the tissue if compared to only traditional liposuction. In case of liposuction as a main procedure without any performing laser lipolysis requires high amount of negative pressure to avulse the adipose tissue which causes more trauma.

Unwanted Effects and Complications

- During treatment the structures found near the treated area may be affected.
- Pay attention to blood vessels, nerves and lymphatic circulation; (e.g. epigastric vessels, periumbilical, throat vessels and as well face and neck nerves) think to anatomic areas!

Severe side effects mainly focused on thromboembolic complications following thermoregulation are thought to be extremely rare. The current report does not support a proper estimate of such a severe complication because there are not simply enough cases to judge from. All laser treated patients must be systematically observed 1-2 days postoperatively for evidence of systemic complication as excessive pain, swelling, discomfort and dyspnea.

Post procedure transitory side effects as pain, edema, slight induration and ecchymosis is most common which resolve spontaneously in a matter of some days, no major side effect has been observed.



Patients has been requested to wear compression bandage and clothing post-procedure for a period of a one to two months. Patients were followed after 3 months post procedure with clinical photography at baseline and post treatment.

Conclusion

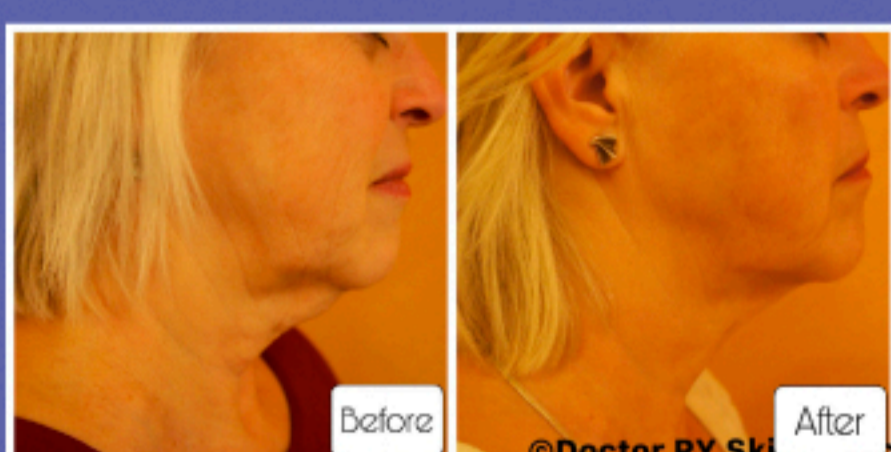
The treatment results can be evaluated after a period of 3-4 months.

Clinical results have shown good efficacy and both patients, and our satisfaction has been optimal.

Overall, the treatment was very well tolerated with few, transient adverse events. All adverse events were graded as mild.

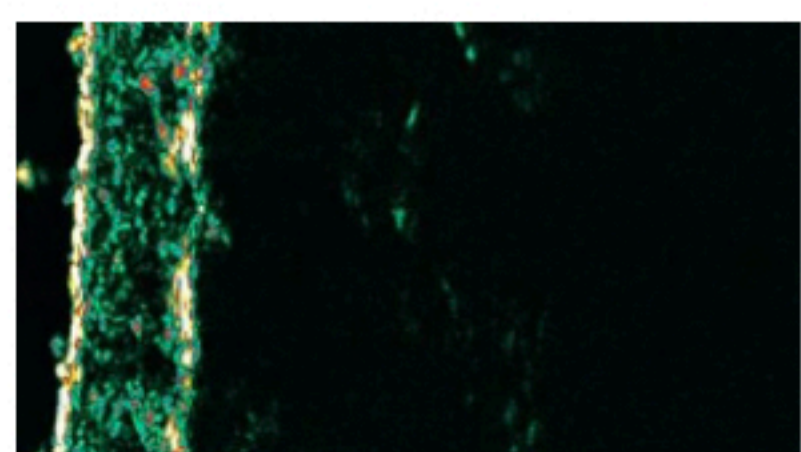
Subjects were satisfied with the treatment, with many indicating they would be willing to undergo a similar treatment in the future.

The method has been minimally invasive with long lasting results for both minimizing adiposity and inducing skin tightening with minimal downtime.

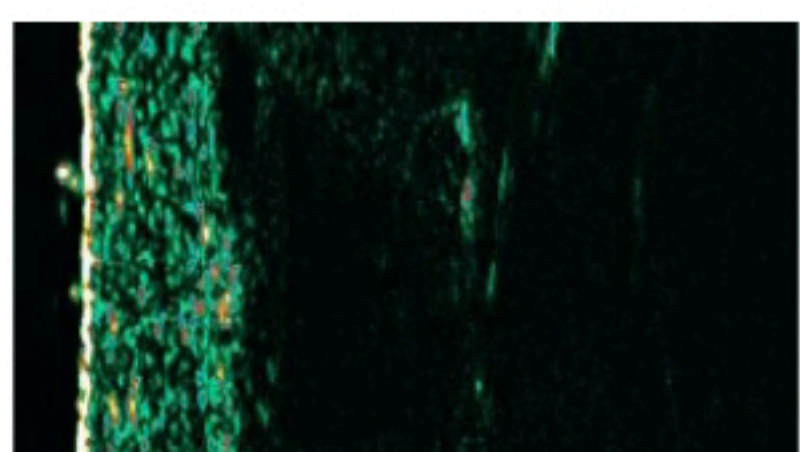


Sonographic and histopathological examination

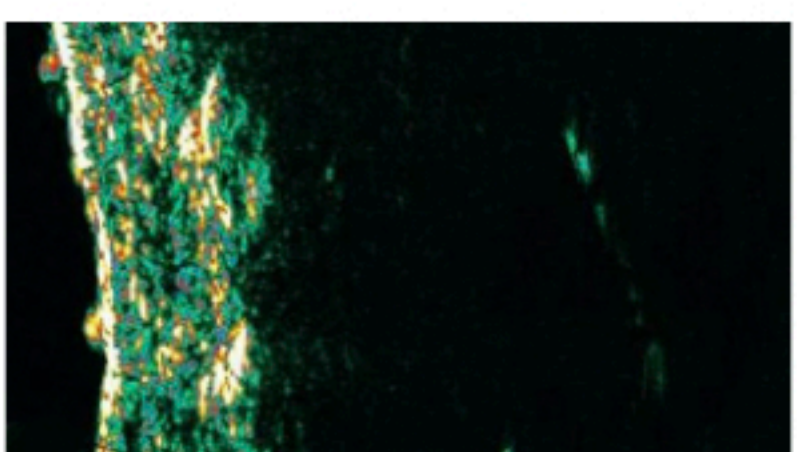
Macroscopically and histologically with the 25MHz colour-coded fine tissue ultrasound.



Before treatment normal dermis thickness and density.



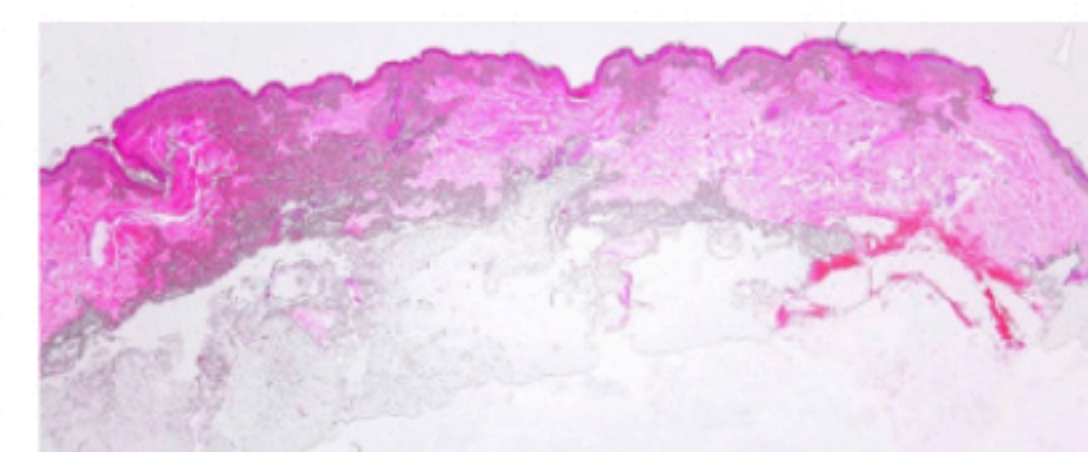
Directly after laser lipolysis: sub-epidermal and collagen fibres of the dermis are loosened and swollen. Fat tissue partly with higher density (haematoma / oedema).



One month after laser lipolysis: definite increase in thickness of the epidermal and dermal fibres, dermal collagen fibres have greater depth. Skin thickness increased by an average 10%.



Piece of tissue from the right lower abdomen. Removed directly following laser lipolysis. On the left side of the image the untreated half can be easily seen due to the normal tissue colour. On the right the heat necrosis of the fat tissue is already easy to see macroscopically.



Histological section of the macroscopy. HE pigmentation (Dr. Rahemi-Pour, Erlangen). Fat tissue on the right is no longer coherent, sub-epidermal elastic fibres and collagen fibres of the lower dermis are loosened.