

Combined SmoothShapes® and SmoothLipo™ Treatments Enhance Outcome of Lipoplasty

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Background and Objective:

Lipoplasty is a popular body sculpting procedure that has been recently augmented with laser-assisted lipolysis for additional tissue tightening and skin retraction. The debate continues as to which wavelengths are most effective in heating adipose tissue and improving clinical outcomes post liposuction.

Several laser wavelengths have been proposed for this procedure. This study was undertaken to evaluate the efficacy of adipocyte-specific dual-band light (650-nm and 915-nm) combined with vacuum and mechanical massage to enhance fat liquefaction and emulsification as well as reduce post-operative side-effects from laser-assisted lipolysis with 980-nm wavelength in combination with standard liposuction.

Study Design and Methods:

Eleven patients scheduled for lipoplasty of the neck, abdomen, thighs and buttocks were divided into 2 groups: six underwent 4-6 SmoothShapes (Elemé Medical, Merrimack, NH) treatments pre- and two post-lipoplasty and 5 served as control.

The SmoothShapes treatment consisted of 20 minutes of transcutaneously delivered 1 W of 650-nm and 10 W of 915-nm wavelengths combined with vacuum and mechanical massage administered in contact, gliding motion over the treatment area. All patients underwent lipoplasty after adequate infiltration of tumescent solution. A small cannula containing 600- μ m fiber delivered 980-nm wavelength (SmoothLipo™, Elemé Medical, Inc.) to raise subcutaneous temperature to 42-45 °C with corresponding skin temperature of 38 \pm 2 °C. Standard liposuction was performed when necessary. Patients were evaluated for post-operative side effects.

Results:

Noticeable difference in the consistency and volume of aspirate from the Smooth Shapes pre-treated vs. non-treated patients. Direct and photographic examination revealed virtual absence of bruising in the SmoothShapes pre-treated areas. Severe bruising was present in all non-treated areas which were rated as "strong" at the 2 week examination. There appears to be nearly complete fat evacuation from the traditionally difficult areas that were pre-treated with SmoothShapes.

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The SmoothShapes® (Figure 1) system utilizes simultaneously delivered 915nm infrared and 650 nm visible light, controlled suction (vacuum) and mechanical massage and is intended for non-invasive and selective heating of cutaneous and subcutaneous tissues.

The 650 nm wavelength was selected for its action in modifying permeability of the adipocyte membranes and enhancement of fat emulsification. This wavelength falls into the so called optical window where there is relatively minimal absorption in the skin components which allows for good penetration to the subcutaneous fat level.



Figure 1: SmoothShapes®

The choice of 915 nm wavelength was based on its preferential absorption in lipids. This wavelength penetrates well into the tissue with even less scattering than 650nm but gets absorbed by the lipids in fat. Temperature inside the adipocytes become slightly elevated causing fat liquefaction. Evacuation of liquefied fat from the inside of adipocytes into intracellular space is facilitated by continuous vacuum massage.

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The light sources operate in continuous wave (CW) mode and total power output from the system is ~11 watts. This system is capable of heating the subcutaneous fat up to a maximum temperature of 40°C. The maximum temperature achieved at the fat layer may increase the rate of lipolysis in the adipose tissue (thus reducing regional fat accumulation) and thermally stimulate the development of the hypodermal fibrous strands. Multiple passes are required to achieve a desired temperature rise in the subcutis. At the same time, the heat is not accumulated in the epidermis and upper dermis due to significantly higher thermal drain rate from these areas. This combination eliminates risks while providing desired efficacy.

SmoothLipo™ (Figure 2) targets localized fat deposits using 980 nm wavelength. The 980 nm absorption profile allows for faster, more homogenous heating of targeted areas producing a more uniform result.

Continuous wave (CW) laser energy uniformly raises the temperature of the treatment area to $45\text{--}55^{\circ}\text{C}$, which is high enough to cause irreversible changes leading to apoptosis of the adipocytes. This process is a more efficient and effective approach that continues well after aspiration has been completed. It also allows for higher energies to be used safely and results in a smooth and uniform outcome.

The heating of the tissue can also lead to a desirable skin retraction or tightening, thus improving the overall cosmetic effect, especially in areas of high laxity.



Figure 2: SmoothLipo™

Study Design and Methods

Eleven patients scheduled for lipoplasty of the neck, abdomen, thighs and buttocks were divided into 2 groups: six underwent 4-6 SmoothShapes treatments pre- and two post-lipoplasty and 5 served as control.

Healthy adults who were candidates for liposuction procedure were included in the study.

Exclusionary criteria included any medical condition prohibiting mechanical massage and/or low intensity light stimulation, i.e., diabetes, pressure and/or light induced urticaria, anticoagulation medication, pregnancy and cancer.

Patients in the experimental group received two SmoothShapes treatments prior to surgery; treatments were administered one week pre surgery and on the day of surgery. Six to eight treatments were administered one to two weeks post surgery based on degree of cellulite.



Figure 3: SmoothShapes treatment

The SmoothShapes treatment (Figure 3) consisted of 20 minutes of transcutaneously delivered 1 W of 650-nm and 10 W of 915-nm wavelengths combined with vacuum and mechanical massage administered in contact, gliding motion over the treatment area.

All patients underwent lipoplasty after adequate infiltration of tumescent solution. A small cannula (Figure 4) containing 600- μ m fiber delivered 980nm diode laser energy to raise subcutaneous temperature to 42-45° C with corresponding skin temperature of 38 \pm 2° C. Standard liposuction was performed when necessary. Patients were evaluated for post-operative side effects.



Figure 4: 15-cm, 16G, stainless steel cannula

Results and Conclusion

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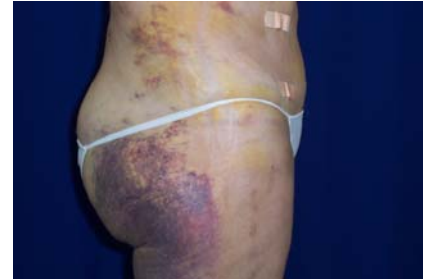


Figure 6: Buttock and poster-lateral thigh without SmoothShapes pre-treatment . Image is 1 week post-liposuction.

Conclusion:

Combination of SmoothShapes and SmoothLipo treatments result in larger volume fat extraction, increased ease of aspiration, limited post procedure side effects and better overall outcome of smoother and tighter skin (Figure 7) than that obtained with traditional liposuction alone.

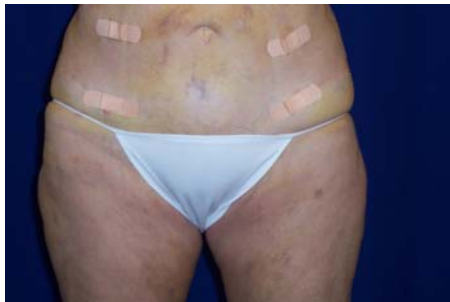


Figure 5: Abdomen Pre-treated with SmoothShapes. Image is 1 week post-liposuction.



Figure 7: Image A: Pre-SmoothShapes and pre liposuction.
Image B: 2 months post-liposuction and SmoothShapes treatments.