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CLINICAL

Laser-assisted

A less-invasive liposculpture technique involves a laser, which is straightforward compared with conventional liposuction, writes Dr Nicola Zerbinati

Laser-assisted liposuction is a technique that uses a pulsed Nd:YAG. The light energy is conveyed by a thin quartz fibre without any power loss. The distal part of the fibre is protected by a 1mm stainless steel cannula for insertion into the sub-dermal tissue.

The interaction between the laser energy and the adipocytes causes lysis of membranes of the fat cells, resulting in a leakage of their contents then dispersal into the interstitial tissue. The laser reduces bleeding and its effect on collagen fibrils promotes collagen retraction and skin shrinkage.

At one time, fatty tissue was extracted in lumps by means of large cutaneous incisions, which produced extensive scarring. In the 1970s, Italian and a French surgeons experimented independently on a new method for removing excess fat. Their efforts led to a procedure named liposuction, lipoaspiration or liposculpture.

The greatest innovation was the use of cannulas for removing large quantities of fat through smaller incisions which reduced scarring. An American surgeon introduced an upgrading of the liposuction technique in 1987, which came to be known as tumescent liposuction. In this procedure, large quantities (several litres) of an adrenalin and anaesthetic solution are infiltrated into the areas of the fat to be aspirated. In the 1990s an ultrasonic vibrating cannula was introduced that allowed for increasing the volume of removable fat.

All these techniques have one big disadvantage: limitations in modelling of the areas treated—

the passage of the cannula creates subcutaneous hollows that are difficult to fill. Another disadvantage is the rupturing of the veins in the fat tissue with considerable blood loss and subsequent haematomas, requiring long-term bandaging.

In laser-assisted liposuction, anaesthesia may be local, peridural, or general. We prefer to use this technique only with local anaesthesia for sessions limited to one to one and a half hours. A small incision of 2mm is made, where the cannula is introduced. The cannula has 1mm diameter with an optical fibre inside. This fibre must be outside the cannula (maximum 2mm). To our knowledge, there are no reports of fibre breaks during procedures.

Control

The surgeon controls the motion of the cannula by a handpiece. Speed must be relatively slow compared with conventional liposuction to allow the necessary time for the laser-tissue interaction. It is necessary to deliver enough accumulated energy to achieve a sufficient lipolysis throughout the different levels of the fat tissue (superficial, medium, and deep) and into the subdermal layer, to reach the collagenous one.

After the lipolysis, the liquid fat can be aspirated using a 2mm or 3mm cannula (with low negative pressure, no more than 0.5 bar), or a standard syringe. It should be considered that the laser energy transforms the fat tissue in a lysate at very low viscosity, very similar to an oily liquid.

We prefer to leave this lysate in situ when we use this technique in small areas such as the

ed liposculpture

face, neck, arms and knees. This is another important advantage of this technique, due to the small diameter of the cannula—it can be used in all the parts of the body where a fat layer is present.

As laser-assisted liposculpture has been introduced and tested for several years, scientific papers have been published. Badin et al were surprised to observe very reduced flabby skin after laser lipolysis. They treated 245 patients in 12 months with no side effects. The only clinical problem was under-correction, because of insufficient delivered energy in their earliest cases.

Goldman et al used laser lipolysis on 1,734 patients in 28 months with similar results, with no important side effects, very low blood loss, low incidence of ecchymoses, and great comfort in the post-operative period. This is also our experience. There is practically no downtime, people are back to their routines in a few hours, and there are no restrictions on activities, except exposure to the

sun should be avoided for a month.

Laser lipolysis was demonstrated to be less traumatic than conventional liposuction methods. The primary reasons for this are the small 1mm diameter cannula and the effects of the laser–tissue interaction.

Dr Badin theorised that the laser–tissue interaction causes thermal damage of the cellular membrane through the liberation of heat and alteration of the Na+K+ “bomb,” permitting migration of the water into the cells until they rupture. This is visible in the pathologic anatomy. In the pathology studies, we can also see the reduction in bleeding resulting from the coagulation of small vessels due to the laser and the lateral thermal effect.

Moreover, due to the laser–tissue interaction with the collagenous and subdermal bands, we can see the thermal effects, including the melting and the rupturing of the bands. This liberates the retracted skin and remodels the collagenous tis-

sue, with clinically evident skin retraction.

Clinically, this tissue interaction produces less swelling, yielding good contour, even in the early postoperative period. Ichikawa et al showed the capability of Nd:YAG laser system to transform the subcutaneous tissue in an oily lysate without any carbonisation. This is due to the particular pulse shape of the laser used in this technique (SmartLipo, Deka, Calenzano, Italy). The peak power and the duration of the pulses have been adapted for avoiding any risk of thermal damage, very important for limiting side effects: bruising, swelling and scars.

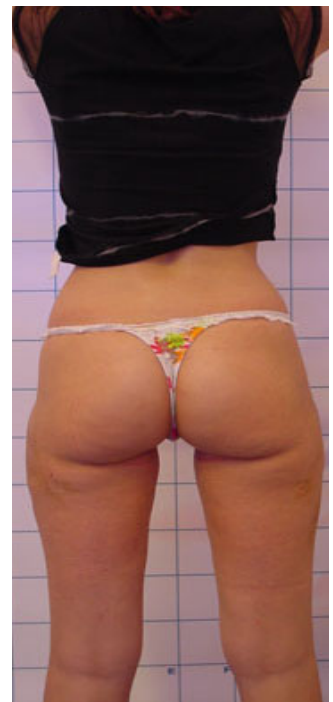
Advantages

Indications for this method of laser-assisted liposuction are areas with current, moderate or potential flaccidity. The main advantages of laser lipolysis are that it is the least invasive technique of liposculpture procedures, it is easy to learn, it requires less post-treatment care, results in minimal blood loss, leads to fast recovery times and provides better flatness of the superficial skin.

Laser lipolysis offers a method that addresses problems previously considered difficult or impossible to solve with conventional liposuction and also permits treatment of nearly any area of the face or body needing liposuction, a clear advantage over ultrasonic liposuction.

In our clinical experience it has proved to be less traumatic, with less bruising and swelling, and improved skin retraction, all demonstrated in pathology studies in the literature. ■

Dr Nicola Zerbinati is a dermatologist who practices in Italy



References

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Top and above: before laser lipolysis on the side part of the legs and three months later after one session. Photos: Dr Nicola Zerbinati

Left top and below: before laser lipolysis on the neck and after three months, one session only. Photos: RG Geronemus, MD, Laser and Skin Surgery Center of New York