

# Liposuction and body contouring

Liposuction, sometimes referred to as 'lipo', slims and reshapes specific areas of the body by removing localised excess fat deposits, and improving body contours and proportions. The effectiveness of liposuction is a testament to its sustained popularity. It is not a treatment for generalised obesity or for loose skin. Liposuction is generally performed under general anaesthesia, supplemented by local anaesthesia. Several assisted techniques that improve the effectiveness of liposuction have been developed. Olivier Branford outlines various liposuction methods and explores the safety, efficacy, indications and contraindications of this procedure

Liposuction is the surgical process by which fat is removed from targeted areas to improve body contours and/or proportions. Since its introduction in the 1980s, liposuction has become the second most popular cosmetic surgical intervention (at times the first) in the world (after breast augmentation), with a 5% increase in number of procedures reported in 2017 (American Society of Plastic Surgeons, 2018).

As it has become more refined with experience, safety, patient selection, preoperative assessment, fluid management, proper technique, and overall care of the patient have been emphasised and improved (Chia et al, 2017).

## Areas of treatment

Liposuction can treat the following areas:

- ▶ Abdomen and flanks
- ▶ Inner and outer thighs ('saddle bags')
- ▶ Buttocks
- ▶ Upper arms
- ▶ Back rolls
- ▶ Chest area, breasts and areas of fullness below the armpits
- ▶ Inner knee
- ▶ Calves and ankles
- ▶ Cheeks, chin and neck.

## Anatomy

Subcutaneous fat is divided by the superficial fascia that envelops the whole body into superficial and deep compartments. The

superficial compartment contains densely packed fibrous structural tissue, whereas the deep compartment is much less compact. The deep and/or intermediate fat layer should be suctioned primarily, but in rare cases, it may be appropriate to perform superficial or subdermal liposuction.

The number of fat cells in an individual does not increase after puberty—once fat cells have been removed, they do not return. The remaining cells, however, can become enlarged.

Men tend to deposit fat around the abdomen and chest. Women typically deposit fat around the hips and thighs.

## Who is a suitable candidate?

In general, good candidates for liposuction are the following:

- ▶ Those with excess localised fat deposits, located anywhere on their body, which do not respond to diet or exercise
- ▶ Adults who are within 30% of their ideal weight (as measured by their body mass index), and who have firm, elastic skin and good muscle tone.

## Who performs liposuction and where?

Complications of liposuction can be potentially life-threatening. The procedure is therefore most commonly performed by plastic surgeons, as they are comprehensively trained in the standards of care for the liposuction procedure, and are fluent in managing complications.

In the UK, liposuction should be performed in a facility/hospital that is inspected at regular intervals by the Care Quality Commission. This is to ensure patient safety and best practice by surgeons who are on the specialist General Medical Council register for plastic surgery.

## What liposuction cannot do

Liposuction is not a treatment for obesity, nor is it a substitute for proper diet and exercise. The procedure is most effective when directed at specific problem areas with localised fat deposits.

Liposuction is also not an effective treatment for cellulite—the dimpled skin that appears on the thighs, hips and buttocks. Moreover, it is not a procedure for loose skin, and can worsen skin laxity if performed excessively. It is not possible to improve lax skin tone with liposuction.

Liposuction is contraindicated in:

- ▶ Smokers due to poor wound healing. Smoking should be discontinued 6 weeks before surgery and 2 weeks after
- ▶ Individuals with medical conditions that can impair healing
- ▶ Individuals who are not fit for general anaesthesia.

## Consultation

The consultation for liposuction should cover the following factors:

- ▶ The patient's surgical goals
- ▶ Medical conditions, risk factors, medical treatments and drug/dressing allergies
- ▶ Medications (avoid taking aspirin, other blood thinners, and anti-inflammatory drugs as they increase bleeding)
- ▶ Vitamins and herbal supplements (which should be stopped 2 weeks preoperatively due to often poorly studied or unknown effects on post-surgical bleeding)
- ▶ Alcohol, tobacco and drug use
- ▶ Previous surgeries.

During the consultation with the patient, the surgeon should also:

- ▶ Assess and agree on liposuction sites with the patient. This may involve taking fat from more than one area and should be done to produce a symmetrical result.



**OLIVIER BRANFORD**

Plastic Surgeon, The Cadogan Clinic, London.  
e: olivier.branford@icloud.com

The hip region is avoided in women to maintain a feminine natural curve, with fat taken above and below this area

- ▶ Take clinical photographs, which may include three-dimensional images which can be morphed to assist in understanding patient goals and how realistic expectations are
- ▶ Pay particular attention to surgical scars as potential sources of hernias. Visceral perforations are most common in the small intestine in patients with abdominal hernias. Skin quantity and quality should be assessed, and differences between excisional procedures and liposuction will need to be discussed with the patients
- ▶ Take circumference measurements at the widest points
- ▶ Explore liposuction options
- ▶ Discuss likely outcomes of liposuction and any risks or potential complications. Patients should arrange for someone to drive them home from the facility or hospital after surgery, and to stay with them for at least the first night following the procedure.



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*Liposuction has become the second most popular cosmetic surgical procedure in the world*

### How it is performed

Liposuction may be categorised according to the amount of infiltration before fat aspiration. This section will provide an overview of common techniques.

#### Dry liposuction

This was the original method of liposuction, which became associated with high blood loss and postoperative pain, as no infiltrate was used.

## Wet liposuction

A total of 200–300 ml of infiltrate is infused per area before liposuction.

## Superwet liposuction

The aim of superwet liposuction is to infuse 1 ml of infiltrate for every 1 ml of fat that is aspirated.

## Tumescent technique

About 2–3 ml of infiltrate is infused for every 1 ml of fat aspirated. This technique produces the least blood loss, bruising and postoperative analgesia. However, this must be balanced against the fact that large volumes of infiltrate can result in a disturbance in fluid balance.

The dry technique results in approximately 25–40% blood loss of the volume removed. Blood loss has been estimated to represent approximately 1% of the liposuction aspirate volume for both tumescent and superwet techniques (Chia et al, 2017).

Most plastic surgeons report using a wetting solution that is a version of the superwet liposuction technique (1:1 infiltrate to aspirate).

The composition of the infiltrate varies between surgeons. A commonly used preparation is:

- ▶ 1000 ml of warmed Hartmann's solution or sodium chloride (which contains less potassium)
- ▶ 25 ml of 2% lidocaine—lidocaine concentrations of up to 35 mg/kg have been used safely (Klein, 1990)
- ▶ 1 ml of 1:1000 epinephrine.

## Assisted techniques

Fat harvest using a fine metal hollow tube (cannula) may be manual for greatest control; however, this could cause surgical fatigue for high-volume cases, and increases the duration of anaesthesia.

## Power-assisted liposuction

Power-assisted cannulae are non-ultrasonic devices to maximise fat removal while reducing both the effort required during liposuction and operator fatigue. These cannulae use a variable-speed motor to provide a reciprocating motion to the cannula, which, in combination with the reciprocating action of the surgeon's arm, facilitates removal of adipose tissue.

## Ultrasonic-assisted liposuction

Ultrasonic energy, delivered by a probe, is used to liquefy fat cells (cavitation). The liquefied fat is then removed in a similar technique to manual liposuction.

The heat generated by the ultrasonic probe may cause skin burns, resulting in scarring, or fat necrosis (hardening), and requires care and expertise. Although benefits of this procedure have been claimed for marketing purposes, one study showed that both surgeons and patients were unable to tell the difference between sides treated with Vaser (vibration amplification of sound energy at resonance) and traditional suction-assisted liposuction (Matarasso, 2012).

## Laser-assisted liposuction

In a prospective, randomised, double-blind, controlled clinical trial comparing outcomes between suction-assisted and laser-assisted liposuction in patients where the authors randomly allocated half a body part for each modality, no major clinical differences were seen (Prado et al, 2006).

## Procedural steps

### Anaesthesia

The choices for pain management include local anaesthesia, intravenous sedation and general anaesthesia. The choice of anaesthesia usually depends of the volume of fat that is extracted from the donor area via liposuction. Extraction of small volumes of fat can be tolerated using a local anaesthetic with or without sedation. However, and more typically in the UK, larger volumes almost always require that the patient receives general anaesthesia for the purpose of comfort.

### Infiltration

This is done after the patient's skin is prepared with antiseptic and draped with sterile towels. Infiltration is performed using a needle or with a cannula through concealed 2–3 mm small stab incisions.

### Liposuction

Liposuction is performed through small, inconspicuous incisions (the same as those used for infiltration). A 3–4 mm blunt cannula is inserted through the incisions to loosen excess fat using a controlled back and forth motion. The dislodged fat is then

suctioned out of the body using a syringe attached to the cannula (for small areas such as the chin) or surgical vacuum (for larger areas).

The volume of fat aspirated from each site is collected and measured, to aid with achieving symmetry. The larger sized cannula is used first, with evening out done by 'feathering' of the edges of the zone with the finer cannula. The suction is turned off when exiting incisions to reduce contour irregularities around these sites.

The flat of the other hand is used to create tension in the skin to avoid tunnelling and contour irregularities during harvest, and surgeons should avoid holding a roll of fatty tissue for the same reason.

Superficial liposuction should be avoided. The inner thigh is prone to contour irregularities, so should always have conservative and judicious liposuction. In the lateral thigh 'saddle bag' below the hip, the fat may be taken deeply close to the deep fascia, avoiding contour problems.

## CPD reflective questions

- ▶ Who would make a good candidate for liposuction?
- ▶ When is liposuction contraindicated?
- ▶ What areas of the body is liposuction usually performed in?
- ▶ What are the risks of liposuction?

## Key points

- ▶ Liposuction should only be carried out by fully trained surgeons and usually requires general anaesthesia
- ▶ Liposuction is not a substitute for weight loss or a treatment for generalised obesity
- ▶ Liposuction may worsen skin laxity
- ▶ Assisted techniques have been developed that improve the efficacy of fat removal: However, not all of these novel techniques are supported by evidence; they may increase the risk of tissue injury, and some have been used as marketing gimmicks
- ▶ When compared with non-invasive treatments, liposuction results are more profound, predictable and consistent

Constant visual and tactile checking of tissues is done to avoid irregularities. The skin can be rolled between the fingers as the 'rolling pinch test' to check how much fat has been removed.

Glue and adhesive strips, or dissolving skin sutures, are then used to close the small incisions.

## Complications

- ▶ General anaesthetic risks: nausea and vomiting, or temporary confusion, may occur, or more serious complications, which are rare (less than one in every 10 000 cases), such as a serious allergic reaction or an inherited reaction to the anaesthetic. Death due to general anaesthesia may occur in every one in 100 000–200 000 cases) (NHS Choices, 2015)
- ▶ Swelling: this typically lasts up to 6 weeks, but final results are only seen at 3 months
- ▶ Bruising: this typically lasts 1 week for every decade of the patient's age. Surgery should therefore ideally be planned at least 4–6 weeks before a beach holiday
- ▶ Contour irregularities or asymmetries: these occur in the harvest areas if too much fat is removed or if this is done too superficially in the subcutaneous tissues. This may be prevented by harvesting smaller more evenly distributed volumes.
- ▶ Bleeding or haematoma: as excessive liposuction empties the tissues of fat, a cavity may be generated which fills with blood, requiring aspiration or evacuation
- ▶ Infection
- ▶ Rippling or increased skin laxity: this results from excessive liposuction or where liposuction was not indicated and the patient should have had abdominoplasty, for example
- ▶ Thermal burn or irregular pigmentation: heat injury may occur from ultrasound ultrasonic-assisted liposuction, causing skin changes or scarring
- ▶ Fat necrosis: this may become infected and drain out through a wound, or may harden and be felt as a lump. This is commonest after ultrasonic-assisted liposuction. It normally softens over 12–18 months, but may need further liposuction if persistent
- ▶ Fluid shifts and physiological disturbance: this can occur with high-volume infiltration or aspiration

- ▶ Abnormal sensation (paraesthesia): this is usually transient but may persist.

Life-threatening complications may also occur as a result of liposuction, such as bowel perforation or pneumothorax (from striking the ribs during abdominal liposuction with the tip of the cannula being forced deeply, or during breast liposuction), necrotising fasciitis, or pulmonary embolism. Death has been reported in 23 out of 200 000 cases (Lehnhardt et al, 2008).

Venous thromboembolism is a serious complication with risks of persistent morbidity or mortality. It has been shown to be the single largest cause of mortality in patients undergoing high-volume liposuction (Grazer and de Jong, 2000).

## Postoperative care

Post-surgical well-fitting garments should be worn for 4–6 weeks on the areas treated (chest, upper arms, abdomen and thighs) to reduce bruising and swelling, and help to shape the tissues as they heal.

Showering can be commenced in the days after surgery and wounds allowed to dry before reapplying surgical garments.

It is important that the surgical incisions are not subjected to excessive force, perspiration, abrasion or motion during the time of healing, which normally takes around 3 weeks.

## Liposuction as an adjunct to other procedures

Fat grafting is an increasingly popular procedure, where the harvested fat is prepared and reinjected to other areas (Branford, 2018). Liposuction can be performed alone or along with other plastic surgery procedures, such as a facelift, breast reduction or abdominoplasty (tummy tuck).

## Invasive vs non-invasive

Liposuction produces a more efficacious, consistent and predictable result than non-invasive treatments. Non-invasive device treatments may be costly, do not eliminate risk completely, and may still have a period of downtime. Studies have shown that non-invasive procedures may cause erythema, and an 8.3% post-inflammatory hyperpigmentation rate has been documented with cryolipolysis, although this has been reported as being transient (Adjadj et al, 2017).

Significant variability, unvalidated outcome measures and bias exist in several low-level non-randomised studies supporting many new non-invasive techniques, and patients should take care when being marketed to. Devices are not all equal and patients should be aware of the explosion of counterfeit devices, unsupported by safety data or clinical studies, and applied by untrained, unqualified practitioners.

## Conclusion

Liposuction continues to be one of the most popular surgical cosmetic procedures, which is testament to its efficacy in experienced hands. The procedure has evolved over the years in terms of its safety and quality of outcomes. Patients should be educated about heavily marketed, new treatments that may not be of benefit, and could provide additional risk. 

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