Liposuction

An update on one of the most frequently performed and controversial surgeries

By Frank D. Fagan

Liposuction surgery (which includes suction-assisted lipectomy, lipoplasty, lipolysis, liposculpture as well as the more recently introduced techniques - ultrasound-assisted liposuction and power-assisted lipoplasty) has become one of the most frequent major aesthetic surgical procedures performed in the United States (where figures are available) and probably in Canada, according to a recent survey (**ASAPS, 1999**).

This survey, along with a review of a number of current journal articles show that liposuction has come a long way since its introduction in the early 1980s (**Illouz, 1983**).

The medical specialists most commonly associated with liposuction procedures include plastic surgeons, dermatologists, and otolaryngologists.

270% increase

In 1998, in the U.S., there were over 218,000 liposuction procedures reported. This represents a 23% increase since 1997, and is almost twice that of any other aesthetic procedure, according to the American Society for Aesthetic Plastic Surgery (ASAPS) in a survey taken in 1998. This survey also found that over half of the patients were between age 19 and 50, and 13% were male (**ASAPS, 2000**).

In an earlier survey, it was reported that there was a 270% increase in liposuction procedures performed on women, and a three-fold increase in men, between 1992 and 1998. This makes liposuction one of the most frequently performed surgical procedures in the country (**ASAPS, 1999**).

Liposuction involves the permanent surgical removal of subcutaneous fat by means of metal cannulas placed through small skin incisions. The cannula is a small tube-like cutting instrument that can be easily inserted under the skin. It mechanically dislodges adipocytes (fat cells), which are then aspirated (by negative pressure suction).

Liposuction targets excess subcutaneous adipose cells that contribute to localized lipodystrophy (a disorder involving the excessive deposition of fat in tissue). The disproportionate number of fat cells in the treated regions are permanently removed, thus remodelling the body contour and aesthetically improving the patient's overall physique. It is expected that any future weight gain or loss will result in a more uniform distribution of fat as the remaining cells hypotrophy or shrink in response to dietary fluctuations. Consequently, weight gain does not result in fat redistribution elsewhere. Implied is that the procedure is designed to achieve greater harmony in body proportions rather than produce weight loss or change in body size.

Patient selection

Successful liposuction is predicated on appropriate patient selection, the surgical/OR staff's expertise, and the patient's awareness of the limits of the procedure. Success is also contingent upon the ability of the overlying skin to retract sufficiently after removal of subcutaneous adipose tissue.

Ideal candidates for this surgery are thought to be healthy individuals in good physical condition (within 30% of ideal weight), with focal areas of lipodystrophy that are resistant to conventional means of improvement, i.e., diet, exercise.

Theoretically, liposuction can be undertaken anywhere there is excess localized subcutaneous fat. However, it is most common on the thighs, legs, abdomen, neck and jowls, upper arms and axillae, breasts, and in flanks and back rolls (**Mladick, 1999**).

Liposuction is a frequent adjunct to conventional (aesthetic) surgical procedures such as face lifting (rhytidectomy), abdominoplasty, breast reduction and breast reconstruction surgery (**Matarasso, 1995**).

An important post-op consideration is that liposuction will not improve other factors that contribute to excessive fullness in an anatomic region such as redundant skin, submuscular fat, muscle and bone. For example, because of fat patterning and distribution changes with age, a large abdominal girth is not amenable to liposuction. Also, no reproducible studies have shown liposuction to permanently improve 'cellulite' deposits.

Non-cosmetic indications for liposuction include treatment for lymphedema (**Brorson, 1998**), axillary hyperhidrosis (excessive sweating), hidradenitis suppurativa, lipomas (fatty tissue tumours), as well as surgical flap elevation and contouring (**Wooden, 1993**). Other non-cosmetic uses include evacuating ruptured silicone-gel breast implants and the removal of post-operative fluid collections.

Peri-operative management

Liposuction can be performed under systemic anaesthesia with supplemental local anaesthesia or with local anaesthesia alone (referred to as super-wet or tumescent techniques). The local anaesthesia is referred to as the wetting solution or infusate. This infusate contains a dilute mixture of lidocaine and epinephrin in a crystalloid solution, which is infiltrated into the subcutaneous fat to provide anaesthesia, analgesia, and hemostasis (**Pitman et al., 1996**).

Since liposuction is now generally performed using a hemostatic infusate that checks bleeding, it has become rare for patients undergoing the procedure to require blood replacement products.

The composition of total aspirate removed typically contains 55% to 90% fat, 20% to 40% infusate, and 0% to 41% blood (**Ibid., 1996**).

The extent of the liposuction depends on patient size, motivation, and number of sites treated. The extent of the aspirate removed may range from a few hundred to several thousand cubic centimetres. A 2-litre liposuction, for instance, represents the removal of almost 17,500 kcal if the tissue were burned as energy.

While guidelines and standards of care do exist, variations in surgical techniques and patient instructions are common. Thus, while routine peri-operative management is possible and advisable, no standards are uniformly applicable to all patients, situations or surgical locales.

Liposuction surgery may be performed in an office, an outpatient clinic, or a hospital, and may be done as an ambulatory procedure or inpatient hospital admission.

Typically, single-site liposuction requires about 1 hour and multiple-site surgery may require an overnight patient admission for observation and monitoring of fluid status, especially if there is a large volume of aspirate, i.e., 4 or 5 L.

Patients are often advised to wear an elastic compression garment for several weeks over the treated sites, which supports the skin as it gradually readjusts to the new contour. Patients can expect to resume their normal activities within a few days after the procedure. They generally achieve their final appearance over several months as edema subsides and skin contraction ensues. Promotion of a healthy lifestyle, including dietary advice, encouragement, and counselling regarding physical activity, and setting realistic weight goals, is an essential aspect of post-op patient management.

Advances in liposuction

There have been a number of recent advances in liposuction technique. Ultrasound-assisted liposuction, which emulsifies fat, has been introduced for use in areas of fibrotic fat. This fat is composed of a higher fibre content as can be found on the back and on the male breast (**Rohrich et al., 1998**).

A variation of the ultrasound technique is external ultrasound, which softens fat prior to its removal by applying ultrasound to the skin surface.

Another new technique is power-assisted lipoplasty, which employs a vibrating cannula.

Probably the most notable advance involves larger volumes of subcutaneous anaesthetic wetting solutions used to infiltrate the fat prior to liposuction. When first introduced, liposuction was performed in a dry environment without subcutaneous anaesthetic infiltration. It is now routine for liposuction procedures to use a wet environment with the addition of a larger volume of wetting

solutions, i.e., superwet formulas (**Klein, 1990**). In the early days of liposuction, most complications were related to the use of excess volumes of lidocaine, epinephrin, and fluid (**Grazer, 2000**).

Complications/Outcomes

Quality-of-life issues are important when considering any aesthetic plastic surgery. A 1998 study showed that in addition to the overall physical improvement that can be obtained through liposuction, there were significant psychological benefits as well. The study reported that, following their liposuction, patients were more self-confident, more satisfied with their appearance, less dissatisfied with their weight, and had considerably higher psychological well-being profiles (**Rankin et al., 1998**). This study also reported that depression scores improved at one month and again at six months after surgery.

The available literature does not make it easy to put a finger on the number and kinds of complications that exist with liposuction. No registry exists for reporting for all the surgeons who perform liposuction, which can be conducted in any number of locales, i.e., office, hospital, etc.

In a survey of plastic surgeons in the U.S. in 1998, the most common complications reported were contour irregularities (0.17%), unplanned or emergency hospital admissions from office/outpatient procedures (0.11%), and prolonged edema (0.9%) (**Rohrich et al., 1999**).

A more recent study (**Grazer, 2000**) found that overall revision or re-operative rates in the U.S. were between 5% and 15%, while rates of fatal complications were in the range of 0.02% to 0.3%.

Those situations reported to be associated with higher complication rates are prolonged procedures, and aspiration of volumes greater than 5 litres (**Daane & Rockwell, 1999**). Other complications include patient dissatisfaction, hematomas, infections, skin burns or hyperpigmentation, irregularities in the skin surface following excessive or subdermal liposuction, and residual contour irregularities requiring secondary treatment.

Adverse outcome of liposuction, although infrequently reported, include pulmonary fat embolism, necrotizing fasciitis, infection, pulmonary edema, fluid overload or lidocaine toxicity, toxic shock syndrome and pulmonary embolism (**Barillo et al., 1998**).

Mortality associated with liposuction has mainly been attributed to pulmonary emboli, abdominal/viscus perforations, anaesthesia complications, and fat emboli (**Grazer et al., 2000**). ■

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