

Plastic surgery for the obese

As increased numbers of overweight individuals request plastic surgery, we have improved management. Through clinical review, Drs. Dennis Hurwitz and Anna Wooten have been able to classify three patient types requesting: (1) correction of a symptomatic oversized part; (2) general reduction through liposuction and/or excision; and (3) body contouring surgery after incomplete weight loss. Overweight adults have increased to 64.5% of the USA population. As restrictive diet and exercise plans fail, many are turning to minimally invasive bariatric surgery. Prompted by patient reports, media exposure web sites, and a cultural change, overweight patients are electing for plastic surgery. Although Type 1 patients, usually covered by insurance, should be informed of the higher risk involved, complementary body contouring is offered. Type 2 patients are treated by large volume ultrasonic assisted lipoplasty and excisional surgery. Systemic inflammatory markers and cardiovascular risk factors may be improved. Tazi successfully treated hundreds of obese patients by following 6 weeks of daily 500 calorie diet and human chorionic gonadotrophin (hCG) injection by large volume surround aspirating system ultrasonic-assisted lipoplasty (SAS UAL). Skin laxity after weight loss is poorly understood, playing a role in Type 3 patients. Patient motivation, rationale and successful experience with multistaged total body lift is discussed.

© Greycoat Publishing Limited, London, UK | Received: 00/00/0000 | Accepted: 00/00/0000

Author: Dennis J Hurwitz MD, FACS*, **Anna Wooten MD†**, ***Clinical Professor of Surgery (Plastic), University of Pittsburgh Medical Center, Pittsburgh, USA**, **†Resident in Plastic Surgery, University of Pittsburgh Medical Center, Pittsburgh, USA**

Overweight individuals may request plastic surgery to correct contour deformities. Until recently plastic surgeons operated on obese patients infrequently, and so little attention has been given to this subset of patients. A variety of factors has greatly increased their ranks and expectations, necessitating new approaches. Furthermore, the metabolic dysfunction and systemic inflammation caused by obesity is now being clarified, along with their improvement following large volume liposuction.

This review is the personal perspective of a senior surgeon with recent practice emphasis in body contouring surgery. Three groups of obese patients are differentiated (Table 1). Although further loss of adipose tissue is a common desirable feature, the three groups differ from each other according to clinical presentations, procedures and expectations.

◆ Patients in Group 1 request correction of a dysfunctional oversized body-part, such as painful macromastia or hanging abdominal

pannus. They are generally limited in their aesthetic concerns and expectations, and are unable to lose further weight.

- ◆ Patients in Group 2 primarily seek liposuction and/or excisional surgery for overall body size reduction. They are unable to lose significant weight prior to surgery and tend to have higher expectations.
- ◆ Patients in Group 3 request body contouring surgery after massive but incomplete weight loss. They pose special surgical challenges and vary greatly in their expectations. They are usually treated with staged total body lift (TBL) surgery with extensive liposuction.

The USA and, to a slightly lesser extent the rest of the developed world, is suffering from an obesity epidemic.^{1,2} Approximately 119 million (64.5%) adult Americans are either overweight or obese. Estimates of the number of obese American adults rose from 23.7% in 2003 to 24.5% in 2004.³

Obesity is usually measured by body mass index (BMI).⁴ BMI is calculated by dividing weight in kilograms by height in metres squared.

>>>

- ◆ A BMI of between 27 and 30 indicates overweight.
- ◆ A BMI of between 30 and 35 is moderately obese.
- ◆ A BMI of greater than 35 accompanied by co-morbidities, or greater than 40 without, is morbidly obese.

Excess weight and obesity increase the morbidity and mortality associated with numerous complications, including type 2 diabetes mellitus, hyperlipidaemia, hypertension and atherosclerosis.⁵ Morbid obesity has a host of lifethreatening health problems such as asthma, obstructive sleep apnoea, cor pulmonale, carcinoma and depression.

Restricting caloric intake and active exercise is the recommended medical approach to weight loss and should be encouraged.³ However, for most obese people, this lifestyle change fails.¹ They either lose an inadequate amount of weight, or they regain it. Whether genetic or acquired, their appetite regulators are dysfunctional. Overeating can be the result of a disorder, not its cause. The obesity-prone gain weight easily, while finding it difficult or impossible to lose it. Decades of diet studies have shown that more than 90% of people who lose weight by dieting gain it back within 5 years.^{2,3}

As dieting and appetite suppressants are rarely long-term solutions, obese people are increasingly turning to minimally invasive gastrointestinal procedures, which have recently become routinely successful and less risky. Roux-en-Y gastric bypass is the most common restrictive/malabsorptive procedure, which works by creating a small gastric pouch and bypassing much of the jejunum.⁴ Patients are pleased with the short procedure, minimal pain and rapid recovery made possible by laparoscopic surgery. They are satisfied by small portions of high protein, low fat meals. The problem of dumping syndrome is solved by patients avoiding dietary triggers. The number of people who have had gastric bypass surgery jumped to more than 103,000 in 2003.⁴

The recent boom in bariatric surgery has led to an increasing number of individuals with sagging skin and unacceptable body contours. Through word of mouth, support groups, television programmes and the internet, they learn about the success of body contouring surgery. A fundamental change is occurring. In increasing numbers, both previously oversized and still overweight patients are rejecting their body shape and requesting not only removal of excess skin but improvement in their body contour. There is a new sense of entitle-

ment, along with an acceptance of the need to pay themselves for this type of surgery. Furthermore, mildly overweight menopausal women are increasingly seeking treatment for their bulging mid-section.

In 2003, the American Society for Aesthetic Plastic Surgery (ASPS) reported 117,688 abdominoplasties, 76,943 breast lifts and 147,173 breast reductions by board-certified plastic surgeons.⁶ Lower body lifts have increased by 127% to nearly 11,000 procedures, upper arm lifts have increased by 68%, and buttock lifts by 70%. For those patients who have lost a massive amount of weight alone, the ASPS reports more than 68,000 body contouring procedures in 2005.⁷

Plastic surgeons operate on obese people only reluctantly. Historically, this has been not so much as a result of prejudice as from concern about the poor aesthetics and high-risk attendant on various medical and wound-healing problems. The coronary artery disease, pulmonary disorders, metabolic syndrome, stress intolerance and depression seen more frequently in obese patients are all conditions that increase the risk of complications and psychological problems. Sutures may pull through heavy, adipose-laden tissues, and tense wound closures are prone to spotty tissue necrosis, wound separations, wound infections and delayed suture abscesses. Rotation of thick skin flaps may compromise circulation and tissue vitality.

Our most common encounter with people categorised as Group 1 (see above and Table 1) is for correction of symptomatic macromastia. Despite encouragement bordering on harassment, only rarely does a patient lose the weight necessary to reduce operative risk and improve outcome. Distressing wound-healing problems are common. A smaller, but usually poorly projecting, breast is created. The reduced breast will compete with surrounding rolls of fat for prominence, unless liberal liposuction of the surrounding chest is performed. Despite delays in wound-healing and compromised aesthetics, these patients are usually very appreciative. No longer burdened by oversized breasts, and poor self-image, some proceed to lose considerable body weight through diet and exercise.

Only rarely do Group 1 patients embrace extensive body contouring surgery. An exception was a 58-year-old woman with a BMI of 31 (Figure 1), who presented with symptomatic macromastia. Realising that breast reduction alone would cause a disproportioned figure,

Table 1. The three groups of patients who present for plastic surgery

Group/type	Presentation	Preparation	Procedures	Expectations	Outcomes
Group 1 Usually stable weight	'Reduce my oversized body part' (e.g. macromastia, low pannus)	Weight loss	Functional surgery; breast reduction; panniculectomy	Reasonable and usually met	Relief of functional disorder, satisfied
Group 2 Usually weight gain	'Make me smaller through liposuction'	Weight loss	Liposuction; SAS/UAL*	Usually unreasonable; too full and loose	Further surgery
Group 3 Massive weight loss	'Shape my body'	Weight loss; review comorbidities	Excisional body contouring plus liposuction	Varies, but often met	Healing complications, but improved aesthetics

*SAS, surround aspirating system; UAL, ultrasonic-assisted lipoplasty.



Figure 1. This patient is representative of Group 1 patients with an isolated complaint of painful bilateral macromastia. Upper photograph: This is preoperative left oblique views of a 58-year-old woman with a BMI of 31. Realizing that breast reduction alone would cause a disproportioned figure, she agreed to 1000 ml of mid-torso ultrasonic assisted lipoplasty, as well as limited and reverse abdominoplasty as shown in her frontal views 1 year later.

she agreed to extensive mid-torso ultrasonic-assisted lipoplasty, as well as limited and reverse abdominoplasties.

The number of Group 1 patients with oversized abdomens is increasing. Unfortunately, abdominoplasty is more problematic for patients in this group. In 1999, Vastine *et al.* retrospectively reviewed 90 abdominoplasties to examine the effect of obesity on the incidence of complications. Their results showed that 80% of obese patients had complications, compared with 32.5% of non-obese patients.⁸ They concluded that obesity had a profound influence on the wound complication rate following surgery. Other studies concur.⁹⁻¹¹ However, if liposuction is used, a mildly elevated BMI may not significantly increase wound complication.¹² Clinical experience confirms that limited undermining with generous use of liposuction reduces wound-healing problems in obese patients.

Group 2 comprises overweight patients presenting for general body contouring. They are also encouraged to undertake preliminary weight loss through dieting and exercise or gastric bypass. Figure 2 shows a 45-year-old woman who wanted aesthetic contouring of an overweight and disproportionate body. She had lost 20.4 kg, but it was insisted that she lose another 6.8 kg to reduce the size of her upper abdomen, which she lost. Limited ultrasonic-assisted lipoplasty (UAL) of the flanks, abdominoplasty and upper body lift was performed, together with mastopexy and spiral flap reshaping of her breasts.¹³

For the many patients unable to lose weight, an alternative can be large volume liposuction (LVL).¹⁴ Depending on the degree of subsequent skin laxity, body contouring surgery follows. Large volume liposuction is defined as the removal of greater than 5000 ml of fat emulsion during a single procedure.¹⁵

While not necessarily a faster method, ultrasonic energy makes the hours of fat dissolution physically easier for the surgeon, allowing him/her to focus on the process. The adipose cells are relatively sensitive to the percussion and cavitation effects of the 20–37 kHz

piston-like action. As noxious heat is generated, preliminary infusion of large quantities of saline is obligatory in order to dissipate the heat. If thermal destruction to surrounding tissue is avoided, then injury is limited to the adipose tissue that is then rapidly and atraumatically suctioned. When thermal destruction extends to surrounding connective tissue or skin, there is diffuse tissue injury. Its most limited form is the loss of shortening of sensitive elastic fibres, leading to poor postoperative skin retraction (unproven hypothesis). Further injury destroys collagen and incites a prolonged inflammatory response (to the burn) causing induration, scarring and seromas.

Since UAL is under the cover of intact skin, the operator cannot see the ablative process. Methods of limiting injury to the surrounding tissues include moving the probe continuously while monitoring its position, using lower power (amplitude of tip excursions), and reducing the duration of the treatment. An absence of tissue resistance indicates cessation of ultrasound energy. Too low a power setting and/or a reduction in treatment duration may lead to inadequate ultrasound application and an excessive subsequent reliance on traditional liposuction.

The LySonix® 3000 (Mentor Corporation, Santa Barbara, California) offers a variety of tip designs with and without inline suction probes. Its golf tee inline suction end provides focused energy that requires a proper technique. The multi-ringed end to the narrower solid probe of the VASER® (Sound Surgical Technologies Inc, Louisville, Colorado) reduces the danger of thermal injury, but must also be used with care. Their vented evacuation system, Ventx®, is less likely to avulse fragile connective tissue than conventional aspiration systems. Both UAL machines offer pulsed energy in order to reduce thermal injury still further. The proper use of either of these systems requires training and thoughtful execution. The therapeutic index is narrow.



Figure 2. This patient is representative of Group 2 patients, who weigh too much for major body contouring surgery. Left: This is a first-visit photograph of a 55-year-old woman. At 1.57 m tall and 67 kg in weight, she has a BMI of 27. She came seeking an abdominoplasty and breast enhancement. Although she had lost 20.4 kg, she still had excess abdominal girth. I requested her to lose an additional 6.8 kg by dieting and exercise, which she did. Right: The oblique view 1 year after her total body lift surgery consisting of an upper body lift and mastopexy with spiral flap breast reshaping, and an abdominoplasty.

>>>

Regardless of the technique, LVL for obesity is controversial.¹⁶ Few plastic surgeons advocate treating obese patients with liposuction because:

- ◆ removal of a large amount of fat represents hours of trauma to the body
- ◆ immediate postoperative care must take account of major fluid and electrolyte shifts
- ◆ retained damaged tissue may require prolonged drainage and, rarely, may be a source for serious infection
- ◆ damage to connective tissue and neurovasculature reduces the capacity for the skin to shrink down to the reduced volume
- ◆ inadequate contour improvement, sagging skin and weight regain are further problems (Figure 3).

There are conflicting studies about the resultant medical improvements, such as a reduction in cardiac risk factor, blood pressure and insulin levels. There are supportive studies on the metabolic benefits of liposuction on cardiovascular risk factors, and diabetes and insulin requirements.¹⁷⁻²⁰ However, clinicians from Washington University in St Louis found no change in insulin action or risk factors for coronary heart disease in 15 women 3 months after lipoplasty of approximately 9.5 kg of fat from the subcutaneous tissues.¹⁴ Patients who went on to lose further weight were eliminated from the study.

Clearly, when suction of bulging fat encourages an improved lifestyle with weight loss, there is an overall health benefit. Italian researchers prospectively studied the medical effects of LVL (average of 3540 ml in 30 obese (BMI 30-45) and 30 non-obese (BMI under 26) patients. Their data showed that 2-3 l of fat removal is safe and associated with improvement of some metabolic (insulin resistance) and inflammatory (cytokines and C-reactive protein) markers, which are indicators of cardiovascular risk.¹⁹



Figure 3. This patient is representative of Group 2 patients, as she wanted a reduction in her body size. Left: Preoperative photograph of a 43-year-old woman, 1.57 m in height, 108.4 kg in weight (BMI 44), who presented for ultrasonic assisted lipoplasty of her trunk and arms. She requested augmentation mastopexy to improve her figure. Right: Eight months after removal of 8400 ml of emulsified fat through VASER® LipoSelection® (Sound Surgical Technologies, Inc., Louisville, Colorado) and concentric ring mastopexy plus 240 ml saline-filled implants. Her weight is down to 99.8 kg and she is much more mobile. Her dress size went from 24 to 18, which pleased her. Her skin retraction was fair. She declined an abdominoplasty, favoring additional ultrasonic-assisted lipoplasty.

In a literature review, the same Italian group found that most of the literature demonstrated that LVL improved cardiac risk and vascular inflammatory markers in obese patients, along with beneficial effects on insulin resistance and vascular inflammation.²⁰ The health improvement resulted from a reduction in the volume of adipocyte tissue, resulting in turn in a reduction in adipokines such as interleukin-6 and tumour necrosis factor alpha, and an increase in the production of anti-inflammatory adiponectin and interleukin-10. The authors suggest that plastic surgery should be incorporated into a multifaceted programme of lifestyle changes for obese patients, both for contouring and for health.²⁰

It is clear that LVL should be performed only by experienced surgeons with a limited number of concomitant procedures. The residual volume theory (total fluid in minus total fluid out) proposes 120 ml/kg of average residual volume to prevent fluid balance problems.²¹ Safety guidelines for LVL (aspirate over 5 l) recommend close observation of the patient in the hospital at the time of peak serum lidocaine levels, 8 hours after the procedure.¹⁵ A meticulous balance between intravenous fluid, tumescent fluid administration and the amount of aspirate is mandatory for successful LVL.

The most comprehensive prospective look at the stress of massive liposuction was carried out by the University of Texas Southwestern Medical Center.²² The centre avoids patients with significant cardiovascular, renal, hepatic or lung disease.

I started LVL with the introduction of UAL into the USA.²³ Others agree on the advantage of UAL for LVL.^{24,25} My patients are reduced in size, but often have more loose skin than they want (Figure 2). Regain of weight is common. A more effective, safe and long-lasting approach appears to be Tazi's recently described combination of drastic preoperative weight loss of deep storage fat, immediately followed by LVL, with an innovative use of ultrasound.²⁶

Tazi's premise is that the weight loss and improved body contour following liposuction is longer lasting, with the preliminary shrinkage of the adipose cells through focus triglyceride release from caloric restriction and human chorionadotrophic (hCG) hormone injections. A given volume of aspirate will remove millions more fat cells if each one is 50% smaller through prior caloric restriction. Over the past 6 years, Tazi has combined the Simeons' method²⁷ of rapid weight loss, with LVL through the surround aspirating system (SAS) of UAL.

Tazi engineered a SAS/UAL system in the mid-1990s, and which he has since used continually in Casablanca, Morocco. A powerful solid ultrasound probe is encased by a firm Teflon® sheath. There is a gap of several millimetres between the end hole of the Teflon® canula and the titanium probe. High-pressure suction speedily draws adipose tissue into this small chamber for the rapid fragmentation of adipose cells, which are then whisked down the encased probe to evacuation tubing. The sonic energy damages only tissue drawn into the chamber, leaving behind minimally damaged connective tissue and obviating end hits. I have presented dramatic selected clinical examples of 10-60 kg of subcutaneous fat loss, by Tazi, using this combined method with little skin laxity²⁸ (Figure 4). Commercial availability is anticipated in 2007.

Tazi incorporated Simeons' weight loss methods through the teaching of Vogt and Belluscio.²⁹ Tazi has treated more than 1000 patients, losing up to 15 kg in a month without complications.²⁶ After appro-

>>>



Figure 4. This is a third patient from Group 2, desiring reduction of her body. Left: Preoperative view of a woman who had 21.5 l of fat removed from her trunk in 3 hours using surround aspiration system/ultrasonic-assisted lipoplasty (SAS/UAL). Right: The postoperative view demonstrates effective removal of large volume of fat with maximal skin shrinkage with SAS/UAL in skilled hands. (Reproduced with permission from Dr El Hassane Tazi of Casablanca, Morocco.)

appropriate screening for endocrine and metabolic disorders, the patient is placed on a programme of daily injectable hormones and a restricted-calorie diet that has been successfully used in more than 10,000 patients over the past 30 years.^{26,29} The rigorous 42-day plan requires 6 days per week of hCG injections coupled with a 500-calorie-a-day diet. A naturally produced oligosaccharide glycoprotein, hCG, has a direct lipolytic effect, and centrally increases satiety.²⁶

With the help of my physician assistant, and plastic surgeon Dr Anna Wooten, I have initiated this programme preoperatively on some of my overweight patients in Pittsburgh. Dozens are routinely losing 9–23 kg prior to plastic surgery. This is an off-label use of hCG since the US Food and Drug Administration (FDA) insists on labelling hCG as ineffective for the treatment of obesity on the product insert.

Twenty studies from the 1970s and 1980s analysing Simeons' 1954 'cura Romana' were split down the middle, with 10 supporting and 10 refuting the special efficacy of HCG in weight loss.³⁰ In some studies, the weight loss was identical to simple caloric restriction with no effects on hunger, mood or localised body measurement.^{31,32} While the FDA dismisses hCG as ineffective, it makes no comments on adverse effects.

Skin laxity following massive weight loss is fascinating. Many plastic surgeons consider skin laxity to be a result of connective tissue that has been stretched for a prolonged time. I suspect the problem is more complex. For the weight loss patient, there is probably a quantitative reduction in organised collagen and elastic fibre connections, as prolonged starvation not only depletes fat cells but also destroys elastic and collagenous fibres. It is the loss of supporting connective tissue that leads to sagging skin. Negative caloric balance is an indiscriminate fire, consuming all energy stores. The remarkable resilience of the skin of Tazi's patients is due to the targeted deep storage dieting and least traumatic liposuction (Figure 4).

Weight loss, liposuction, hormones and body contouring surgery affect the appearance of skin and skin subcutaneous tissue inter-

phase. Unfortunately, there is no consistent pattern of skin changes after weight loss. The Skin Sciences Institute in Cincinnati employed three-dimensional laser surface scanning, tissue composition by dual energy X-ray absorptiometry, dermal-subcutaneous structure with three-dimensional ultrasound and in-situ biomechanical measurements, to find that most of their 44 subjects showed an improvement in cellulite with weight loss, while the condition worsened for others. Improvement was associated with significant reductions in weight and the percentage of thigh fat, significantly higher starting BMI, and significantly greater initial severity.³³

Another clinical experience supports the theory that acquired skin laxity after weight loss or liposuction is due in part to trauma to connective tissue. When postoperative skin sag is a concern, a common recommendation is to treat areas of the body circumferentially. It is likely that the minimally suctioned areas, and therefore the areas with the best preserved connective tissue, assist in the overall contraction of the skin. The connective tissue of the bulging areas is so injured in the process of removing all that fat that it cannot participate in skin shrinkage. It is also clear that superficial lipoplasty, immediately under the skin, assists in skin contraction. But this approach risks devascularisation of the skin, which can result in skin necrosis. Many plastic surgeons are therefore reluctant to take maximal advantage of superficial lipoplasty. Finally, partial injury to connective tissue may lead to scar formation, with a resulting shortening of collagen bundles, leading to dermal skin retraction.

Group 3 patients are massive-weight-loss patients who present for body contouring but are still overweight. The abdomen, waist, hips and thighs remain too large, and they are frustrated by not having met their weight reduction goal. They are candidates for Simeons' diet, but only a few take advantage of it, having already been through a somewhat disappointing incomplete weight-loss programme. Moderate volume liposuction would reduce their size to acceptable dimensions. In such instances, liposuction is combined with resectional surgery. This is controversial because the trauma of the suction on the vascularity of the flaps may reduce vitality, or induce infection or seroma.

Rohrich *et al.* are proponents of concomitant moderate volume liposuction in their recently published 151-patient series.³⁴ They average 4 l of UAL (up to 8450 ml) from the upper lateral flank, lower back, upper buttocks, hips, medial thighs, and entire abdomen during their central body lift circumferential body contouring. They report high patient satisfaction, show excellent results and list a low rate of complications: three major (2%) (two deep vein thromboses and one pulmonary embolism (PE) and 32 minor (21.1%). Surgical revision was required in eight patients (5.3%).³⁴

Cardenas-Camerena and Gonzalez's study of LVL (> 1500 ml) and extensive abdominoplasty documents liposuction and abdominoplasty to be a safe and effective combination for liposculpture and contouring.³⁵

Hunstad reported a high rate of seromas with his combination technique of circumferential excision and liposuction in obese patients, but thought the results merited the seroma problem.³⁶ In fact there is a safety factor in discontinuous undermining of the abdominal flap by means of liposuction, which has been shown to be almost as efficacious as direct undermining with the advantage of improved blood supply.³⁷

>>>

The ultimate test of this approach is the highly successful Brazilian-developed procedure lipoabdominoplasty.³⁸ All undermining and fat removal is by liposuction, and only skin is excised. These surgeons also offer lipoabdominoplasty to their massive weight loss patients if there is no abdominal hernia.³⁷ Others have reported that the combination of multiple trunk excisional procedures with liposuction has no greater number of complications than isolated abdominoplasty. However, obese patients (those with a BMI greater than 30, compared with those with a BMI under 25) have significantly increased morbidity regardless of the number of procedures.^{39,40}

Total body lift (TBL) surgery is my comprehensive and co-ordinated approach to body contouring surgery in as few stages as possible.⁴¹ Creating competing high-tension skin closures in the mid- and lower body has not compromised the healing or aesthetic results. Moreover, there are some advantages, such as in the treatment of gynaecomastia with abdominoplasty. Patients requesting TBL surgery are usually considering cost and convenience. As noted by Beran, 'combining the procedures reduces total cost, wages lost, operative time, anaesthesia time, recovery time and time out of work'.⁴²

This is made possible by experience, organisation, efficient surgery and multiple operative teams.⁴¹ Due to the sheer magnitude of the operation, overweight and obese patients are routinely staged. Staging takes into consideration patient health, fitness, weight, age and motivation. 'Motivation' refer to the patient's desire being so strong to have only one major operative session that the patient is prepared to accept the increased risk involved. These strict criteria limit single-stage TBLs to relatively few patients. Patients with bleeding disorders, histories of deep vein thrombosis, diabetes, or infections, or those who are otherwise at high risk, are generally refused a combination procedure.

Obese patients have single operations performed along with LVL of their excessively large areas. There are borderline cases with moderate volumes of liposuction of the thighs (1000 ml each) that test the surgeon's judgement about how much can be accomplished (Figure 5).



Figure 5. This patient represents those in Group 3, who desire major body contouring surgery but who have not lost enough weight. Left: This is a preoperative view of a 39-year-old woman, 1.63 m in height, 81.6 kg in weight (BMI 31) who requested total body lift (TBL) surgery after losing 68 kg due to gastric bypass surgery. Abdominoplasty, lower body lift, upper body lift with spiral flap breast reshaping and vertical thighplasty were done. Bilateral brachioplasties and some scar revisions were performed 1 year later. Right: Results are shown 14 months after her TBL surgery.

Extra care of oversized closures during surgery includes:

- ◆ less aggressive width of skin excision
- ◆ use of numerous large-gauge braided absorbable sutures soaked in antibiotic solution
- ◆ maintenance of normothermia throughout the procedure.

Two weeks of preoperative preparation with arginine- and glutamine-enriched protein supplement may also retard wound infections.

There comes a point when loose tissues are just too heavy, and in these cases LVL can be used for first-stage debulking. The thigh skin will sag greatly, so that 6 months later the definitive thighplasty needs to be done.

CONCLUSION

Plastic surgeons are presented with an increasing number of obese patients in each of the three groups discussed. While all three groups should be encouraged to lose weight preoperatively, each group needs a different approach if the goal weight is not reached.

Group 1 patients seek correction of an isolated oversized body part such as macromastia or hanging panniculus. Although requested to, these patients rarely lose adequate weight prior to their breast reduction or panniculectomy. However, their expectations are not high and are usually met. Elective liposuction in contiguous areas should be suggested, as that can vastly improve results.

Group 2 patients seek liposuction and/or excisional surgery for overall size reduction. If they are unable to lose adequate weight, they submit to LVL. Often the volume removed is still not enough, while the skin sags further, leaving them disappointed and resorting to high-risk excisional body contouring surgery.

Group 3 obese patients seek body contouring surgery for skin laxity after massive but inadequate weight loss. Their body contouring surgery needs to be combined with extensive liposuction, resulting in a high rate of complications. These patients are candidates for multistaged TBL surgery. Most are grateful but invariably need extensive revision surgery.

All three groups need to be cautioned on the increased risks and the compromised aesthetics caused by their obesity. Plastic surgeons devoted to body contouring surgery will assume responsibility for the preoperative weight loss and nutritional preparation of their patients. Simeons' highly restricted-calorie diet accompanied by daily injections of hCG is one proven approach to the rapid preparation of obese patients for body contouring surgery. When plastic surgeons manage to achieve significant preoperative weight loss in their obese patients, the outcomes of body contouring surgery will be vastly improved.

Improved technology and techniques for the safe, rapid and aesthetic removal of large volumes of fat need to become generally available. I believe that the skilled use of SAS, as demonstrated on a large series of patients over the course of 10 years by Dr Tazi, is a method worthy of consideration.

The recent increase in the number of oversized patients presenting to plastic surgeons is a special opportunity not only to improve the

>>>

results of our body contouring surgery, but also the health and well-being of a whole new group of patients. Plastic surgeons should become familiar with the serum inflammatory markers related to obesity in order to improve their selection of patients for major procedures and the better to follow the clinical improvement of all their obese patients postoperatively. Closer cooperation with bariatric centres is envisaged.

DISCLOSURE

I have unexercised stock options in Sound Surgical Technologies, Inc., the maker of VASER®. I am a minority stockholder of SafeLipoplasty, Inc., which has no product, but proprietary rights to Sound Aspiration System and the Simeons' HCG Diet.

REFERENCES:

1. Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999–2000. *JAMA* 2002; 288: 17237.
2. National Task Force on the Prevention and Treatment of Obesity. Overweight, obesity, and health risk. *Arch Intern Med* 2000; 160: 898–904.
3. *F as in fat: how obesity policies are failing in America 2005*. Published by The Trust for America's Health. <http://healthyamericans.org/reports/obesity2005>.
4. www.asbs.com
5. Kopelman PG. Obesity as a medical problem. *Nature* 2000; 404: 635–643.
6. www.surgery.org
7. www.plasticsurgery.org
8. Vastine VT, Morgan RF, Williams GS *et al*. Wound complications of abdominoplasty in obese patients. *Ann Plast Surg* 1999; 42: 34–39.
9. Rogliani M, Silvi E, Labardi L, Maggiulli F, Cervelli V. Obese and nonobese patients, complications of abdominoplasty. *Ann Plast Surg* 2006; 57: 3, 336–338.
10. Matory WE Jr, O'Sullivan J, Fudem G *et al*. Abdominoplasty surgery in patients with severe morbid obesity. *Plast Reconstr Surg* 1994; 59: 513–551.
11. Chauat M, Levan P, Lalanne B *et al*. Abdominal dermolipectomies: early post-operative complications and long-term unfavorable results. *Plast Reconstr Surg* 2000; 106: 1614–1618.
12. Van Uchelen JH, Werker PM, Kon M. Complications of abdominoplasty in 86 patients. *Plast Reconstr Surg* 2001; 107: 1869–1873.
13. Hurwitz DJ, Agha-Mohammadi S. Post Bariatric Surgery Breast Reshaping: The Spiral Flap. *Ann Plast Surg* 2006; 56: 481–486.
14. Klein S, Fontana L, Young VL *et al*. Absence of an effect of liposuction on insulin action and risk factors for coronary heart disease. *N Eng J Med* 2004; 350: 2549–2557.
15. Iverson RE, Lynch DJ: American Society of Plastic Surgeons Committee on Patient Safety. Practice advisory on liposuction. *Plast Reconstr Surg* 2004; 113: 1500–1503.
16. Matarasso A, Kim RW, Kral JG. The impact of liposuction on body fat. *Plast Reconstr Surg* 1998; 102: 1686–1689.
17. Samdal F, Birkeland KL, Ose L, Amlund PF. Effect of large volume liposuction on sex hormones and glucose and lipid metabolism in females. *Aesth. Plast. Surg* 1995; 19: 131–135.
18. Hardy KJ, Gill GV, Bryson JR. Severe insulin-induced lipohypertrophy successfully treated by liposuction. *Diabetes Care* 1993; 16: 929–930.
19. Giugliano G, Nicoletti G, Grella E *et al*. Effect of liposuction on insulin resistance and vascular inflammatory markers in obese women. *Brit J Plast Surg* 2004; 57: 190–194.
20. Esposito K, Giugliano G, Scuderi N, Giugliano D. Role of adipokines in the obesity-inflammation relationship: the effect of fat removal. *Plast Reconstr Surg* 2006; 118: 1048–1057.
21. Lee C. Guidelines for ensuring safety in large-volume liposuction. *Seminars of Plastic Surgery* 2002; 16: 153–156.
22. Kenkel JM, Lipschitz AH, Luby M *et al*. Hemodynamic physiology and thermoregulation in liposuction. *Plast Reconstr Surg* 2004; 114: 503–513.
23. Johnson P, Hurwitz DJ. Quantitative assessment of the results of ultrasonic assisted lipoplasty with dual-energy X-ray absorptometry: a preliminary report. *Aesthetic Surgery Journal* 1997; 17: 1–6.
24. Commons GW, Halperin B, Chang CC. Large volume liposuction: a review of 631 consecutive cases over 12 years. *Plast Reconstr Surg* 2001; 108: 1753–1763, discussion 1764–1767.
25. Commons GW. Considerations in large-volume liposuction. *Seminars of Plastic Surgery* 2002; 16: 143–152.
26. Boulahriess M, Tazi E, Gueddari G, Naamane A, Fellat K, Zarrpuck L. The treatment of obesity by the method of Simeons and Trudy. Poster presentation. Faculty of medicine, University of Morocco, Al Hakim Clinic, Casablanca, August 2006. [Author query: Has Dr Tazi been able to provide a published reference?]
27. Simeons AT. The action of chorionic gonadotrophin in the obese. *Lancet* 1954; 267: 946–947.
28. Hurwitz DJ. *Surround aspiration system for ultrasonic assisted lipoplasty*. Presentation in the Hot Topics seminar of the Annual Meeting of the American Society of Aesthetic Plastic Surgeons, Orlando, Florida, April 21, 2006.
29. Vogt T, Belluscio D. Controversies in plastic surgery: suction-assisted lipectomy (SAL) and the HCG (human chorionic gonadotropin) protocol for obesity treatment. *Aesthetic Plast Surg* 1987; 11: 131–156.
30. Rabe T, Richter S, Kiesel L, Runnebaum B. [Risk-benefit analysis of a hCG-500 kcal diet (cura romana) in females.] *Geburtshilfe Frauenheilkd* 1987; 47: 297–307. German.
31. Shetty KR, Kalkhoff RK. Human chorionic gonadotripin (hCG) treatment of obesity. *Arch Intern Med* 1977; 137: 151–155.
32. Greenway FL, Bray GA. Human chorionic gonadotropin (HCG) in the treatment of obesity: a critical assessment of the Simeons method. *West J Med* 1977; 127: 461–463.
33. Smalls LK, Hicks M, Passeretti D *et al*. Effect of weight loss on cellulite: gynoid lipodystrophy. *Plast Reconstr Surg* 2006; 118: 510–516.
34. Rohrich RJ, Gosman AA, Conrad MH, Coleman J. Simplifying circumferential body contouring: the central body lift evolution. *Plast Reconstr Surg* 2006; 118: 525–535.
35. Cardenas-Camarena L, Gonzales LE. Large-volume liposuction and extensive abdominoplasty: a feasible alternative for improving body shape. *Plast Reconstr Surg* 1998; 102: 1698–1707.
36. Hunstad JP. Body contouring in the obese patient. *Clin Plast Surg* 1996; 23: 647.
37. Illouz YG. A new safe and aesthetic approach to suction abdominoplasty. *Aesthetic Plast Surg* 1992; 16: 237–245.
38. Matos WN, Ribeiro RC, Marujo RA *et al*. The classification and indications for lipoabdominoplasty and its variations. *Aesth Surg J* 2006; 26: 417–431.
39. Simon S, Thaller SR, Nathan N. *Aesth Surg J* 2006; 26: 413–416.
40. Rogliani M, Silvi E, Labardi L, Maggiulli F, Cervelli V. Obese and nonobese patients: complications of abdominoplasty. *Ann Plast Surg* 2006; 57: 336–338.
41. Hurwitz DJ. Single stage total body lift after massive weight loss. *Ann Plast Surg* 2004; 52: 435–441.
42. Beran SJ. Combining procedures: balancing risk and reward. Editorial. *Aesth Surg* 2006; 26: 443.

CORRESPONDENCE TO

Dennis J Hurwitz MD, FACS
 Clinical Professor of Surgery (Plastic) University
 of Pittsburgh Medical Center
 Hurwitz Center for Plastic Surgery
 3109 Forbes Avenue, Suite 500
 Pittsburgh
 Pennsylvania 15213
 USA
 E-mail: drhurwitz@hurwitzcenter.com