Body Contouring Surgery in the Massive Weight Loss Patient

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INTRODUCTION

An estimated 36.7\% of the adult population in the United States is obese.\textsuperscript{1} Defined as a body mass index of greater than 30 kg/m\textsuperscript{2}, obesity is associated with comorbidities that double mortality from cancer, cardiovascular disease, and diabetes.\textsuperscript{2} Predictions based on a linear time trend suggest that 51\% of the US population will be obese, and 9\% will be morbidly obese by 2030.\textsuperscript{3} Weight loss by dietary changes and exercise usually does not achieve the desired weight loss goals on an individual.\textsuperscript{4} As such, bariatric surgery has become the treatment of choice for obesity and morbid obesity.\textsuperscript{5} The Roux-En-Y gastric bypass procedure remains the gold standard surgical option for the

KEYWORDS

- Body contouring surgery
- Massive weight loss
- Total body lift
- Liposuction
- VASER

KEY POINTS

- Body contouring surgery after bariatric surgery addresses the large quantities of inelastic skin after massive weight loss.
- The author puts forth 11 surgical principles to approach body contouring in the massive weight loss patient.
- Proper patient selection, unique preoperative preparation, intraoperative planning, and resource management improve results and reduce morbidity.
- Technical advances in women include improved management of adiposity with spiral flap augmentation/suspension of the breasts and concomitant ultrasonic-assisted lipoplasty and lipoaugmentation.
- Direct oblique excision of flank bulges extending posterior to the abdominoplasty instead of the traditional lower body lift is yielding better mid/lower torso contours.
obese patient with gastric sleeve gaining traction. In the course of achieving massive weight loss (MWL) and alleviation of comorbidities, bariatric surgery creates quality-of-life problems for the plastic surgeon.

Minimally invasive gastrointestinal bypass surgery for morbid obesity was successfully pioneered by Phillip Schauer at the University of Pittsburgh Medical Center.\(^6\) Despite their numerous health advantages, disgruntled patients soon complained of disturbing lax skin and subcutaneous tissue. Schauer asked the senior author to help. Addressing a hospital auditorium full of MWL patients, Hurwitz learned of the disheartening changes in body contour with repulsive hanging skin and bizarre rolls of skin and fat. They were embarrassed by flattened breasts, hanging pannus, ptotic mons pubis, and sagging inner thighs. Clothes fit poorly. Vigorous activity was difficult. Skin beneath folds becomes moist, malodorous, and inflamed.

In the late 1990s, plastic surgeons limited their treatment of skin redundancy of the torso and thigh by a circumferential abdominoplasty, a lower body lift, and a medial thighplasty.\(^7\)–\(^13\) Sagging breast were treated independently. The results often fell below expectations. Delayed wound healing was common. There was scant precedent for successfully performing body contouring surgery after MWL. The bypass patients of the 1980s usually underwent the physiologically disruptive jejunal-ileal bypass and were poor candidates for prolonged body contouring surgery. Modern minimally invasive surgery with the Roux-en-Y gastrointestinal bypass delivered a much less traumatized and healthier patient. After 4 years of innovative effort, we introduced a comprehensive single stage solution called total body lift surgery.\(^14\)

Body contouring after MWL is now embraced as a safe and reliable option to improve self-esteem, social life, work ability, physical activity, and sexual activity.\(^15\)–\(^21\) Most often excisional, body contouring surgery can also use liopaspiration, dermal suspension techniques, and autologous fat grafting. It has been estimated that as many as one-third of MWL patients will require reconstructive surgery after their weight loss. Estimates as high as 80% purport that patients desire body contouring surgery after MWL; however, only 12% undergo the corrective surgery.

**CURRENT APPROACH AND PRINCIPLES**

Because of comorbidities and prolonged postoperative negative nitrogen balance (starvation), we avoid panniculectomy coincidental with gastric bypass. Moreover, the panniculectomy scar may preclude optimal subsequent surgical planning for definitive torso contour correction. After MWL, panniculectomy is simply the removal of hanging panniculus by a long anterior transverse excision of skin and fat between the umbilicus and pubis. There is no undermining of the superior flap or alteration or reconstruction of the umbilicus. Panniculectomy may be complemented with liposuction of surrounding, non-undermined bulging skin. It satisfies the medical indications by correcting the inflammatory sequelae of an overhanging pannus. This limited abdominoplasty is rarely aesthetically adequate.

Our innovative total body lift approach features comprehensive and coordinated planning in as few stages as possible.\(^14\) Loose skin is excised and gender-specific features sculpted. Female adipose-related features of the breasts, waist, hips, and buttocks are shaped.\(^22\) Men have restoration of upper body dominance and visibility of broad superficial muscles with aggressive treatment of gynecomastia and love handles.\(^22\) These are extensive and complex operations over large portions of the body, requiring a team of operators, working in consort from 3 to 6 hours with the patient under general anesthesia. Minor wound healing complications were common, but major morbidity is rare.\(^23\) Before embarking on such lengthy procedures, the surgeon and
the support team and hospital should have experience working together on less extensive procedures. Two days of hospital care are essential. The larger the patient and the longer the procedure, the more likely are complications.

These multiple operations are lengthy, envelop large portions of a big body, and require position changes and high-tension closure of undermined and thinned flaps. The operative plan is based on the application of plastic surgical principles that incorporate artistry, with minimal trauma to tissues. Accordingly, we have listed the 11 relevant plastic surgery principles for successful results with a low complication rate. The precise technique varies according to the deformity and surgeon preferences, but the principles are inviolate (Box 1).

The first principle is to analyze the patient and deformity. Consider body shape (endomorph, mesomorph, or ectomorph), extent of deformity, impact on the patient, patient priorities, lifestyle, and tolerance for risk. MWL leaves a deflated shape related to familial and gender-specific fat depositions and skin to fascia adherences. In men there is a tendency to retain adipose around the flanks, intraabdominally, and breasts. Female fullness lies in the subcutaneous fat of the abdomen, hips, and thighs. Redundant skin hangs over regions of fibrous adherence of dermis to deep fascia. Oversized people, endomorphs, cannot be transformed into ectomorphs. However, with the aid of complimentary VASERlipo, minimally traumatic debulking can be done.

Exclude from total body lift surgery candidates having unstable chronic medical and/or psychiatric illnesses and unrealistic expectations. Borderline cases may undergo limited procedures such as an abdominoplasty.

The consultation continues with a focused examination with the aid of a full-length mirror. Digital preoperative images are manipulated for the patient to understand the anticipated changes. Electronic pens draw anticipated incision lines, indicating the direction of tissue tensions and final scar placement on multiple views. Their estimated new silhouette can be morphed with no promises. During follow-up, both disappointed and pleased patients are reminded of the extent of their original deformity by having a monitor with all possible images available near the examination room. There are often extensive layered folds, wrinkling, and striae. The skin is like an oversized in elastic suit and in no dimension, vertical or horizontal, is there normal skin tension.

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**Box 1**

**Plastic surgery principles with a low complication rate**

1. Analyze deformity and patient
2. Efficiency in design, organization, and execution
3. Optimal orientation of tissue excision
4. Accurate preoperative incision planning
5. Focus on contour and shape
6. Contour with autogenous tissues
7. Integration of liposuction with excisional surgery
8. Preserve dermis, subcutaneous fascia, and neurovasculature
9. Tight and secure closure
10. Anticipatory perioperative management
11. Analyze clinical experience
Efficiency in design, organization, and execution is the second principle. The surgeon should develop a consistent procedure so that the surgical assistants can anticipate. Instrument requests are made before they are needed. Wasted motion and repeated effort lengthens an already long operation, thereby increasing bleeding, medical and wound healing complications, surgeon fatigue, and costs. Slow but steady is the rule.

Reliable preoperative markings expedite team surgery. The most effective and efficient positioning and turning of the patient starts in the prone and ends in the supine positions, which includes placing the leg in abduction. The flap with the greatest movement is elevated first. The operation starts with the inferior incision of the lower body lift. Once mobilized, the buttock and thigh flap is pulled superiorly and the anticipated superior incision line is confirmed and incised. The intervening low back and flank skin is removed as an island of skin and fat from side to side. Appropriate traction and countertraction permit rapid resection through a potentially bloody and nondistinct plane of dissection. Care is taken to leave behind the ideal and symmetric adipose level along the flanks and hips. The central back closure is not too tight to better tolerate the marked flexion needed for the subsequent abdominal closure. Before the patient is turned, the posterior portion of the medial thighplasty is performed superficially along the inferior gluteal fold. Later, the patient is turned and placed in the supine position onto a second operating room table and sterile sheets for the abdominoplasty. Experienced residents assist or perform portions of the procedure with both the attending and the residents suctioning fat or suturing simultaneously.

The third principle is to excise skin in the optimal orientation. Skin redundancy is predominantly vertical, and crisscrossing with vertical excisions leaves compromised flap tips. Transverse scars are easily placed within underwear areas and are less likely to hypertrophy. Plan the trunk scar along the bikini line, which is easily covered and represents the greatest circumference of the female torso. When the relatively narrow waist level excess skin is advanced over the iliac crests, much of the transverse excess is taken in. An inverted superior anterior midline V excision is reserved for removal of widened and depressed surgical scars. A posterior V-shaped excision is limited to the midline buttock flap, to help rotate in excessively redundant lateral thigh skin. A broad vertical segment of midline back skin is invariably adherent, and therefore it is only excised as the end of a transversely oriented ellipse. A series of oblique excisions are reserved for the muscular male.

Preoperative definitive incision planning, the fourth principle leaves, level scars. Most excisions are planned with the patient reclining, but checked standing. Mid and upper abdominal transverse scars are included in the excision, to avoid possible skin necrosis, whenever possible.

The fifth principle is to focus on the contour and shape of the tissue left behind, much as in a breast reduction. Do not let the removal of excess skin distract from this ultimate goal.

The sixth principle is to contour with autogenous tissue, such as regional flaps or lipoaugmentation whenever augmentation of adipose related features is needed.

The seventh principle, integration of liposuction with excisional surgery, necessitates gentle fat removal. Preliminary VASER (Solta, Valient Pharmapeudicals) ultrasound system disrupts only fat, and the not the neurovascuature allowing for minimally traumatic follow-up lipoaspiration.

The eighth principle preserves dermis and subcutaneous fascia by preliminary infiltration along the anticipated incision of 100 of mL of lactated Ringer’s solution with 1 mg of epinephrine and 40 mL of 1% xylocaine per liter. This preparation minimizes
bleeding and limits the use of electrocautery to pinpoint coagulation through the incision. The incision is slightly beveled along the dermis and then made perpendicular through the fat and subcutaneous fascia.

The ninth principle dictates a high-tension skin flap closure. After MWL, skin flaps are inelastic. The flap vessels are large, a remnant of the prior obesity, permitting greater undermining and closure tension on the flaps. Correction of the lateral thigh saddlebag deformity has been improved by fully abducting the leg onto a side utility table while closing with the patient in the prone position. Nevertheless, the farther from the suture line, the less effective is the pull. Therefore, following a bikini line closure and upper thighplasty, residual laxity is seen in the epigastrium, midlateral trunk, and distal thighs. This upper laxity can be treated secondarily through a reverse abdominoplasty, which we have transformed into the upper body lift. Lower thigh laxity is corrected by direct excisions along the medial and posterior thighs. When high-tension closure is present, some late thinning of the subcutaneous tissues can occur, particularly in the lateral buttock region. The inclusion of a deepithelialized upper buttock flap fills out the central flattened buttocks, but not laterally. Preliminary approximation with towel clips keeps the tension during closure of the wound minimal. Optimal torso closures are achieved by flexing the trunk, approximating the wound edges with #2 PDO Quill large subcutaneous tissue bites followed by intradermal 3-0 Monoderm. These barbed sutures evenly distribute closure tension. Along with the absence of knots, the Quill device has considerably reduced our operative time and minor wound healing problems.

The tenth principle is anticipatory perioperative management. A complete medical and nutritional evaluation with provision of needed supplements is essential. The opportune time to perform body contouring is when the patient has completed the catabolism and has reduced comorbidities. In the event that a motivated patient is unable to achieve their desired weight loss goal, the author has successfully incorporated a 42-day injectable human chorionic gonadotropin/500 calories per day program. Since 2004, this program has been used by the Hurwitz Centre for Plastic Surgery in Pittsburgh and has witnessed an average of nearly 1 pound lost per day per patient without complications.

Experienced anesthesiologists will be prepared for the position change and protection of the face and weight-bearing surfaces. A foam rubber mask with a cutout for the endotracheal tube has been our preferred approach (Gentle Touch 5” headrest pillow by Orthopaedic Systems Inc, Union City, CA). Intravenous fluids are scaled down in consideration of the use of several liters of saline tumescent subcutaneous injections for liposuction. The anesthesia team controls intraoperative fluid and medical management. The need for colloid and blood replacement is discussed during the procedure. All patients are monitored continuously, which includes urine output. Hemoglobin concentration is optimized with iron and vitamin supplements, resorting to iron infusions if necessary. Erythropoietin may be taken a month before surgery, accepting an increased risk for thromboembolism. Larger patients pre donate 1 to 2 units of blood for later transfusion. Or, preferably, our anesthesiologist removes about 500 mL at the beginning of the case, replenishes the volume with saline, and then administers the donated blood at the end of the case. In that way, patients do not receive thrombogenic old banked blood. A liter of Hespan, colloids helps to restore both volume and oncotic pressure. Intermittent leg pressure pumps are activated and intravenous antibiotics are given before the induction of general anesthesia. Additional risk factors for thrombophlebitis, a history of phlebitis, thromboembolism, lower extremity swelling, age greater than 50 years, prolonged surgery and obesity prompts the use of low-molecular-weight heparin.
Patients are hospitalized for about 2 days for fluids, electrolytes, and pain management. In addition, their movements are assisted to reduce excessive tension on tight suture lines.

Edema, infections, phlebitis, and seromas are reduced by closing wounds as expeditiously as possible over suction catheters. Elasticized garments with minimal pressure over the lower abdomen are comfortable and reassuring to the patient. Aside from some periumbilical and groin flap tacking sutures, we have not closed the abdominoplasty dead space. Lower abdominal subscarpa fascia lymphatics are preserved as much as possible. Seromas are a rare. Postoperative external ultrasound (VASERShape, Solta, Valient) has speed resolution of edema.

The 11th principle is that analyzing the aesthetic results and the patient outcomes 1 year or more postoperative is very instructive. Inquire about patient satisfaction and consider measures for improvement. Review standard photography to gauge results. Our deformity and outcome grading scale is applied.\textsuperscript{22,29} Correction of deformity may not always equate with optimal aesthetic results, but it is an improvement. The best aesthetics leave the most unobtrusive symmetric scars and gender-specific contours.

**CLINICAL EXPERIENCE**

Over the past 16 years, this author has performed more than 1800 procedures on more than 400 patients after MWL, pregnancy, or aging. These include singly or in...
combination abdominoplasty, lower body lift, upper body lift, medial thighplasty, bra-chioplasty, mastopexy, breast reduction, facelift, gynecomastia correction, liposuction, and lipoaugmentation. The body mass index ranged from 24 to 42 kg/m². Owing to the potential for a high rate of complications, we have treated few patients with morbid obesity.

Fig. 2. J torsoplasty combined with spiral flap reshaping of the breasts and L brachioplasty in a 42-year-old massive weight loss patient. (Left) Before left lateral and oblique views with preoperative markings. (Right) Result with uncomplicated healing at 6 months.
An upper body lift treats epigastric skin, mid back folds, and flattened, distorted breasts. In males, upper body lifts treat ptotic gynecomastia in continuity with loose chest skin and back rolls. In women, the upper body lift focuses on establishing a higher and firm inframammary fold. The breasts are raised and augmented with nearby spiral flaps. For all but the most severe deformity, a J-shaped lateral torsoplasty is performed to avoid back braline scars (Figs. 1 and 2). Commonly, these operations are extended through arm reduction surgery via an L brachioplasty. This method corrects the ptotic posterior axillary fold, reduces the oversized axillary hollow, removes excess subaxillary skin, and defines the lateral border of the breast seamlessly and smoothly.

When a much deeper waist is envisioned, the abdominoplasty is extended obliquely posterior over the flanks (Figs. 3 and 4). In addition to this, we have found success in the combined lipoabdominoplasty with central high-tension closure. Defatting of the abdominal skin flap significantly increases the upper flap dispensability and preserves the perforating blood supply. Caution is taken by not suctioning the midline fat in the area of the 3-flap deepithelialized umbilical cutout. Tension at the central distal end of the abdominoplasty is reduced by the plication of small epigastric skin flaps to the fascial base of the umbilicus.

Fig. 3. Left posterior oblique view of a 59-year-old massive weight loss patient marked for abdominoplasty extending obliquely over the flanks and lipoaugmentation of the buttocks.
SUMMARY

A dedicated and experienced surgical team can safely and effectively offer total body lift surgery after MWL. Recent advances have improved safety and aesthetic results.

REFERENCES


Fig. 4. Left posterior Oblique view of a 59-year-old massive weight loss patient 5 months after abdominoplasty extending obliquely over the flanks and lipoaugmentation of the buttocks.


