

Upper Body Reshaping for the Woman with Massive Weight Loss: An Algorithmic Approach

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Abstract

Background Body contouring after massive weight loss represents a rather new surgical field. Many areas of the body are affected such as the back, the upper arms, and the breasts in the upper body. Combining more than one such area in a single operative step can yield many advantages. The author proposes a single-step approach to the upper body of the woman with massive weight loss and offers an algorithm to simplify the operative plan.

Methods Based on the characteristics of the individual, each adjacent region is analyzed for the potential of surgical improvement. Several lifting techniques can be used to restore the shape of each region. The breast represents a rather unique entity in which three basic types can be recognized. Accordingly, a surgical plan is formulated and discussed with the patient.

Results The presented algorithm was used successfully for 17 consecutive women after massive weight loss. Although the time for these combined operations was increased, patient safety was not reduced nor were the number of complications increased compared with multiple smaller operations. The overall treatment plan for this patient group was greatly enhanced and simplified with this approach and resulted in great patient satisfaction.

Conclusion Body contouring after massive weight loss presents a steadily increasing surgical field. Typically, multiple operative steps are required to achieve the

patient's ultimate goal. The author offers a surgical algorithm that aids in the operative planning for the upper body of such patients that simplifies this operation and yields great patient satisfaction.

Keywords Algorithm · Body-lift · Breast · Massive weight loss · Surgery · Upper body

Contouring of the body and redefining an aesthetically pleasing silhouette for the patient with massive weight loss constitutes an emerging field in plastic surgery. New techniques for optimal treatment of this unique patient cohort are published constantly. For the lower body-lift initially popularized by Lockwood [1], the operative numbers have risen approximately 4000% in the last decade [2].

In recent publications, the main focus has been on optimal shaping of the body's lower part. The upper body as a unit has received much less attention. However, this region also causes a lot of distress to these patients. The three main areas of concern are the breast, the upper arms, and the back. Especially in the female, the breast displays a variety of deformations after massive weight loss. Thus, reshaping of the breasts is of utmost importance for these patients. Innovative techniques for optimal results have been offered in the literature, such as the spiral flap [3], total parenchymal reshaping [4, 5], and pedicled perforator flaps [6, 7]. Similarly, solutions to correct deformities of the arms [8–10] and the back [11, 12] that yield great patient satisfaction have been published.

In contrast, integrated approaches to the upper body of the patient with massive weight loss have not been reported frequently to date [13, 14]. All the aforementioned techniques treat only one area, but in many cases, combining

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two or more of these techniques would yield much better results. The possibility of taking advantage of excess tissue that otherwise would have been discarded makes a combined approach very interesting. This report aims to offer an algorithmic approach to the upper body of the woman with massive weight loss to obtain optimal results and to minimize the number of single operations required.

Evaluation of the Patient Variables

The breast is the key factor in establishing an optimal plan for the woman with massive weight loss. Almost all women after massive weight loss present with ptosis of the breast to some degree. Variable deformities include skin rolls of the back and lateral torso, ptosis of the posterior axillary fold, and tissue redundancy of the upper arms (Fig. 1). These variables are either present or not (“plus/minus” variables), whereas the breast constitutes an area with various forms of appearance. In general, three main types exist, resulting in different surgical approaches.

Type 1: Breast Hypertrophy

Type 1 is characterized by classical breast hypertrophy and volume excess. The solution is a reduction mammoplasty according to the surgeon’s preference using either an inverted T pattern or a vertical scar design. In some cases, a free nipple graft yields an aesthetic result without the hazard of nipple necrosis.

Type 2: Breast Ptosis with Adequate Volume

Most women exhibit type 2 after massive weight loss. The hallmark of this presentation is marked breast ptosis with adequate breast volume. Most commonly, the patients do not want any reduction in their breast volume, but rather, a

more youthful, lifted appearance of their breasts. Thus, a mastopexy would be the solution to this problem.

Although numerous different techniques can be used for mastopexy, the technique described by Rubin et al. [4, 5] known as “total parenchymal reshaping” is particularly suitable in this clinical setting. This technique provides a broad pedicle on which the nipple–areola complex (NAC) is transposed superiorly. Most patients present with a very long sternal notch-to-nipple distance, resulting in otherwise long pedicles, whether superiorly or inferiorly based, with the risk of ischemic nipple necrosis.

The aforementioned technique is very safe with regard to pedicle vascularity. Furthermore, the technique is very versatile in producing an aesthetic breast mound even in the case of marked breast ptosis.

Type 3: Breast Ptosis with Inadequate Volume

Type 3 offers the greatest variety of surgical solutions. In general, three options exist according to the patient’s individual characteristics and wishes. If breast ptosis is only marginal to moderate, a breast implant will yield a very good result with the least scar pattern. The size of the breast can be tailored to the patient’s goals and body habitus.

In some cases, a pronounced lateral breast roll extends from the lateral extension of the breast onto the back. This redundant tissue can be used as an autologous filling material to augment the breast. An additional positive effect is the lifting of the lateral thorax, which can be extended, resulting even in a back-lift. Patients have to be made aware of this interesting possibility. However, use of this technique to produce a pleasing breast shape with this so-called spiral flap certainly is somewhat difficult [3]. For the best mobility and freedom for flap shaping, a perforator-based harvesting technique is recommended [6, 7]. If the flap size is too generous or the flap circulation is compromised, fat tissue necrosis might ensue, with late palpable masses in the breast.

In selected cases of patients who do not have redundant tissue on the lateral thorax but insist on autologous tissue, free flap transfer can be offered as a solution. The harvesting of a bilateral flap for breast augmentation also can be incorporated into the body-contouring plan such as a deep inferior epigastric perforator (DIEP) flap (abdominoplasty), or even more suitable, a transverse myocutaneous gracilis (TMG) flap (thighplasty). Thus, the patient can benefit from the harvesting procedure that rejuvenates a different region of the body. However, this certainly is the most laborious procedure, which must be discussed in detail with the patient to prepare him or her for the complex and potentially very risky procedure. On the other hand, if successful, this is the most elegant method, which eliminates two problem areas in one operation.

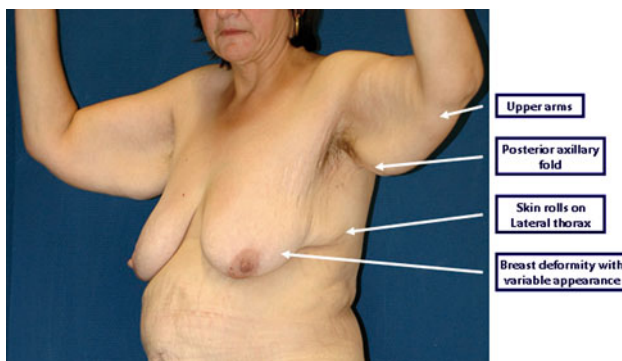


Fig. 1 Variable problem areas in the upper body of the woman with massive weight loss

Case Reports

Case 1

A 54-year-old woman presented to our department due to a weight loss exceeding 130 lb resulting from gastric banding. In the first step of her integrated approach to postbariatric body contouring, a lower body-lift was undertaken. She reported pronounced breast ptosis, tissue redundancy in the upper arms, and rolls on the back of her upper body. She was satisfied with the volume of her breasts (Fig. 2).

An upper body-lift was planned with a dermolipectomy on the back and lateral thorax, an upper arm-lift with repositioning of the posterior axillary fold, and a reduction mammoplasty using the total parenchymal reshaping technique.

Case 2

A 43-year-old woman lost approximately 70 lb after a laparoscopic gastric banding procedure. She underwent abdominoplasty and a mastopexy operation. She presented to our department 1 year after the breast procedure reporting the deflated appearance of her breasts and requesting more volume. Due to the relative excess of tissue in the lateral thorax region, an autoaugmentation with a spiral flap in conjunction with a brachioplasty was offered to the patient. At the 6-month follow-up visit, the

patient was very satisfied with the operative result, especially the added volume to the breast (Fig. 3).

Case 3

An 18-year-old woman with a massive weight loss of approximately 65 lb presented to our department for body contouring. After a lower body-lift had been performed, the upper body was treated with brachioplasty using an L-type excision of redundant tissue and a separate breast augmentation through an inframammary approach without any additional shaping procedures in a single operation. Postoperatively, she was very satisfied with the result (Fig. 4).

Case 4

A 34-year-old woman lost more than 200 lb due to lifestyle changes without any bariatric procedures. As contouring procedures for the lower body, she underwent T-abdominoplasty followed by a lower body-lift. For the upper body, she first received a superior-based, inverted T mastopexy together with a spiral flap augmentation procedure. Due to the very thin subcutaneous tissue located on her lateral thorax region, the spiral flap did not yield sufficient tissue (Fig. 5).

At her 6-month follow-up visit, the woman was dissatisfied with the result. Because the patient planned to undergo a vertical thigh-lift, she was offered the possibility of microsurgical augmentation of both breasts with a

Fig. 2 Pre- and postoperative views of the patient in case 1 with 130 lb of weight loss. *Upper row:* Preoperative appearance with skin and tissue redundancy in all problem areas associated with massive weight loss. *Lower row:* Results 6 months after the upper body-lift consisting of breast reshaping, brachioplasty, and dermolipectomy of the back. The postoperative result was rated excellent by the patient

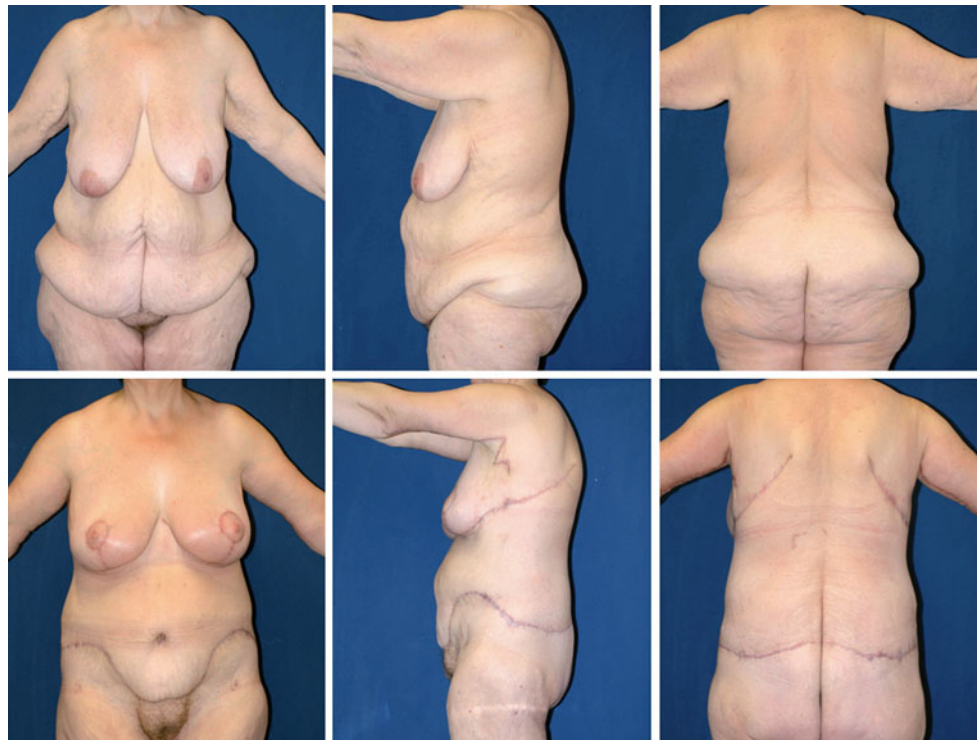


Fig. 3 Pre- and postoperative views of the patient in case 2. *Upper row:* This patient lost about 70 lb after a laparoscopic gastric banding procedure and underwent abdominoplasty and a mastopexy. She was unhappy with the deflated appearance of her breasts together with the excess tissue in the lateral thorax and the upper arms. *Lower row:* Improved contour of the upper arms and better breast volume after breast autoaugmentation with a spiral flap from the lateral thorax region in combination with a brachioplasty. In the three-quarter view, the donor-site scar of the spiral flap can be seen. The postoperative result was rated excellent by the patient



Fig. 4 Pre- and postoperative views from case 4. *Upper row:* Marked breast atrophy together with redundant tissue in the upper arm but not located adjacent to the breast on the lateral thorax. Therefore, this patient is not a candidate for autoaugmentation using a spiral flap, so breast augmentation with cohesive anatomically shaped implants and L-type brachioplasty was planned. *Lower row:* 3 months after the operation there was an enhanced appearance of the breast together with an improved contour of the upper arms. The postoperative result was rated good by the patient

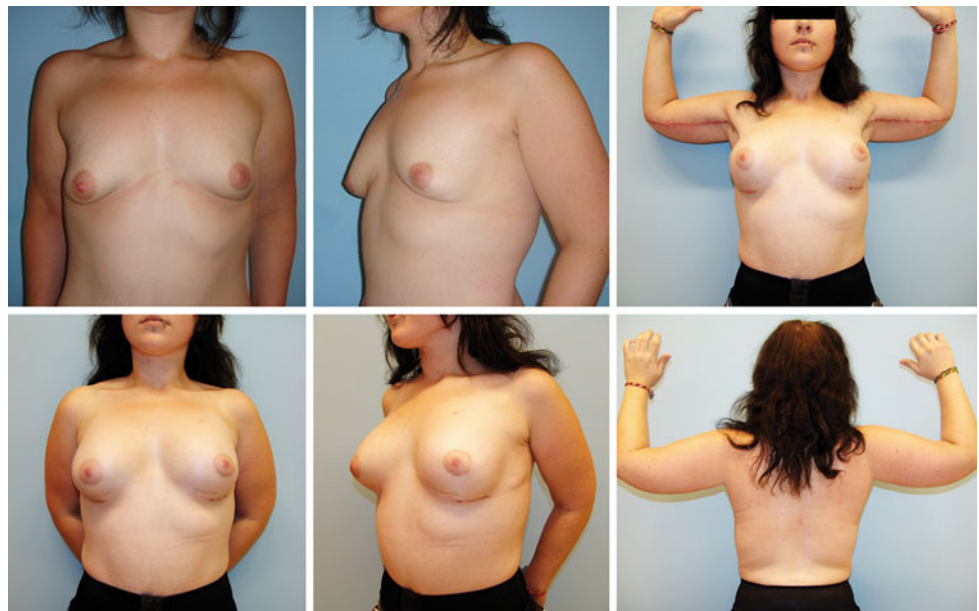
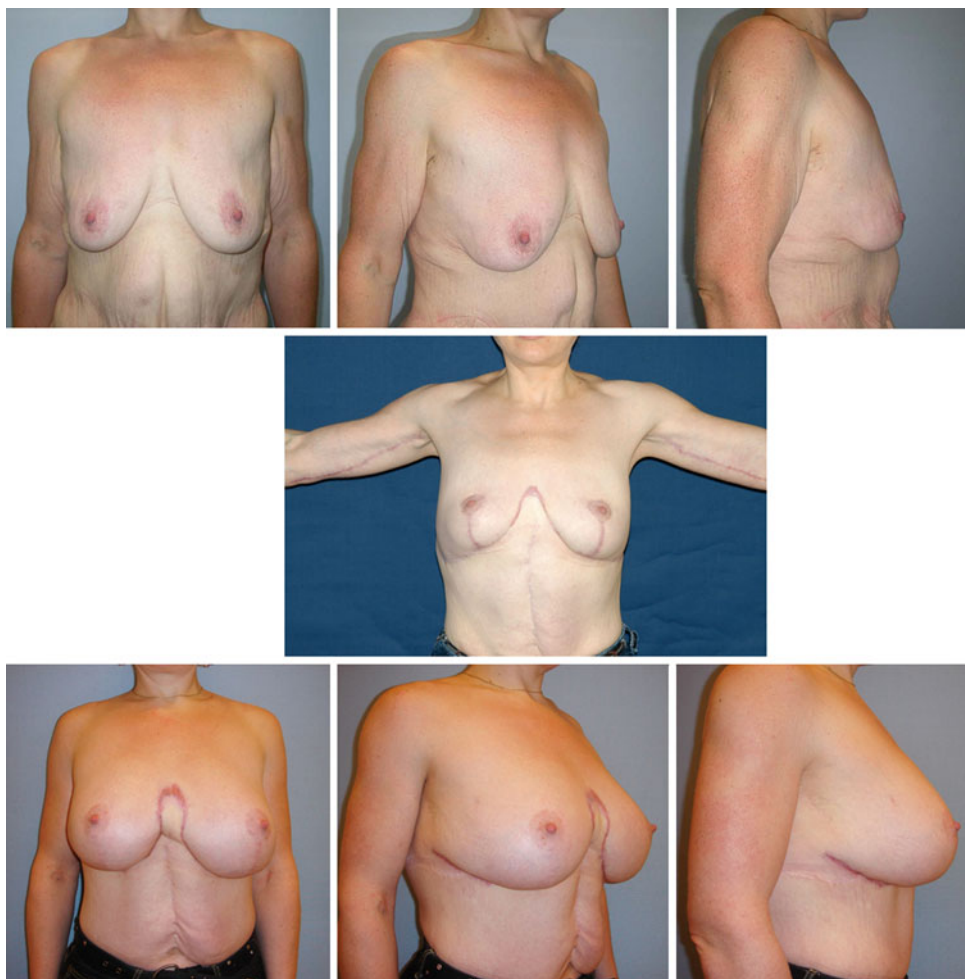


Fig. 5 Pre- and postoperative views of patient in case 4.

Upper row: View before any operative procedure in the upper body after a weight loss of more than 200 lb. The patient underwent L-type brachioplasty together with a breast autoaugmentation procedure using a spiral flap from the lateral thorax. *Middle row:* Result after this procedure. The patient was dissatisfied with volume of her breasts, so she was scheduled for microsurgical breast augmentation with bilateral TMG flaps together with recontouring of the thighs. *Lower row:* Results of the patient's upper body at the 16-month follow-up visit after a further revision with refixation of the inframammary fold. The postoperative result was rated excellent by the patient



bilateral TMG flap harvested during the thigh-lift procedure. The TMG flap was harvested bilaterally, and after extension of the excision toward the knee, the thigh was closed to produce a sufficient lifting effect. Both flaps were transferred to each breast and, using an inframammary approach, were anastomosed to the internal mammary vessels.

The woman's postoperative course was smooth, and she was discharged 12 days later. At her 10-month follow-up visit, the inframammary fold was repositioned due to flap displacement. The patient was very satisfied 6 months later with the pronounced augmentation effect produced by the TMG flap.

Results

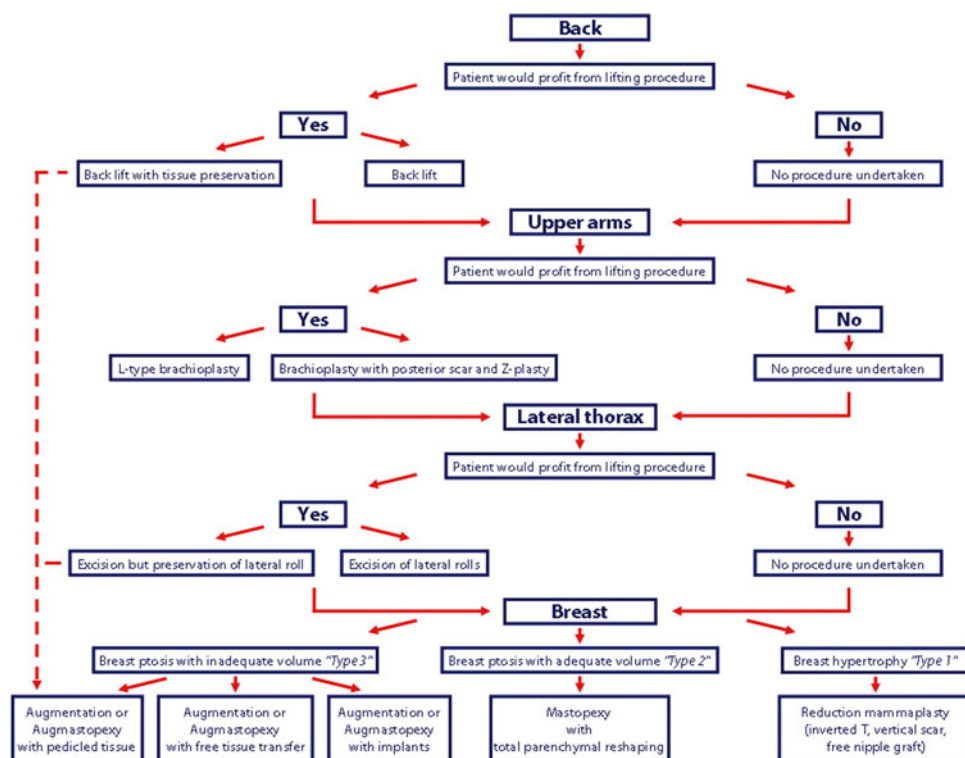
The presented algorithm (Fig. 6) was successfully applied for 17 consecutive women after massive weight loss who presented to our department for improvement of overall body contour. A detailed overview of all the operative

procedures performed for these patients is given in Table 1. All the operations were performed by a single surgeon with the help of a surgical assistant. The individual times for completion of the operations also are given in Table 1.

The postoperative regimen used to prevent venous thromboembolism [15] consisted of compression garments according to the regions treated (i.e., arms, breasts) immediately after completion of the operation. The patients were encouraged to engage in early ambulation on the day of surgery. Postoperatively, all the patients received low-molecular-weight heparin in a prophylactic dosage during their hospital stay.

The only serious complication we encountered was a unilateral hematoma on postoperative day 1 that required reoperation for a patient, with total parenchymal reshaping of the breast. Besides that, only minor complications such as minor wound healing problems were seen. No nipple necrosis occurred in any reduction mammoplasties or mastopexies. Late operative revisions had to be performed for three patients. For one patient, a contracture over the axilla in a posterior type brachioplasty required a Z-plasty,

Fig. 6 Surgical algorithm for the planning and treatment of the upper body of the woman with massive weight loss. Although the breast is the pivotal point to consider for an optimal outcome after reshaping of the female upper body subsequent to massive weight loss, for practical reasons it is useful to start considering any procedures in the algorithmic work flow for the back. Starting with the breast procedure and repositioning the patient in the prone position afterward would compromise the operative reshaping of the breast in cases that require a back procedure. See text for further details



whereas for another patient, a scar revision had to be undertaken after L-type brachioplasty due to widening of the scar.

For a third patient who underwent augmentation mastopexy and reduction of the areolar diameter with Gore-Tex suture (Gore-Tex; W.L. Gore & Associates, Flagstaff, AZ, USA), the Gore-Tex suture broke due to minor wound healing complications, resulting in an asymmetrical areolar diameter. A revision operation with the patient under local anesthesia had to be performed to match the unequal size.

Cosmetic Results

The postoperative aesthetic results were evaluated by asking the patients to rate subjectively their postoperative cosmetic result and their degree of satisfaction compared with their preoperative appearance using a 3-point scale (excellent, good, or poor). The results were excellent for 14 of 17 patients and good for the remaining 3 patients. No patient reported a poor result.

Objective assessment was performed by two independent surgeons and a plastic surgery nurse who reviewed pre- and postoperative photos of all the patients and rated the aesthetic result on a visual analog scale ranging from 1 (unacceptable result) to 10 (excellent result). This resulted in a mean postoperative cosmetic result of 8.2 ± 1.5 (range, 6–10) as evaluated by three independent investigators using a visual analog scale (Figs. 2, 3, 4, 5).

Discussion

Body contouring after massive weight loss often involves multiple steps to achieve a satisfactory result. In most cases, more than one area of the body is of concern to the female patient. In the upper body, these areas include the upper arms, the back, the rolls of the lateral thorax, and the breast. Whereas the other areas typically represent areas of sagging tissue and redundancy, the breast displays a variety of possible deformities ranging from severe atrophy to massive hypertrophy. Thus, the breast must be approached differently because simple lifting procedures will not yield the best possible outcome in a number of cases.

Several techniques have been introduced recently for the treatment of various problem areas in the upper body of women with massive weight loss. These techniques include an extended brachioplasty procedure for rejuvenating the upper arm and axilla [8, 9], techniques for improving the back contour [11, 12], and various techniques for breast reshaping [3–6]. However, all the cited reports focus only on one aspect of the upper body without offering a comprehensive approach.

The goal of this report is to accept the upper body of the woman with massive weight loss as a single unit that must be treated using a combined approach. The presented surgical algorithm is not a new technique in itself but offers an elegant solution of combining the most effective operative techniques published earlier for an optimized outcome.

Table 1 Summary of all the operative steps performed in the presented patient group after application of the surgical algorithm for a combined treatment of the female upper body after massive weight loss

Patient	Back	Upper arms	Lateral thorax	Breast	Operation time (min)
1	No procedure	L-type brachioplasty	No procedure	Augmentation with implants Type 3 breast deformity	130
2	Back-lift	Brachioplasty with posterior scar and Z-plasty over axilla	Lifting procedure	Total parenchymal reshaping Type 2 breast deformity	340
3	No procedure	L-type brachioplasty	Lifting procedure	Augmentation with free transverse musculocutaneous gracilis flap Type 3 breast deformity	660
4	Back-lift	Brachioplasty with posterior scar and Z-plasty over axilla	Lifting procedure	Total parenchymal reshaping Type 2 breast deformity	330
5	No procedure	No procedure	Tissue excised but not discarded	Autoaugmentation with spiral flap Type 3 breast deformity	160
6	No procedure	L-type brachioplasty	Lifting procedure	Total parenchymal reshaping Type 2 breast deformity	245
7	Back-lift	L-type brachioplasty	Lifting procedure	Total parenchymal reshaping Type 2 breast deformity	310
8	Back-lift	Brachioplasty with posterior scar and Z-plasty over axilla	Lifting procedure	Total parenchymal reshaping Type 2 breast deformity	325
9	Back-lift	Brachioplasty with posterior scar and Z-plasty over axilla	Lifting procedure	Total parenchymal reshaping Type 2 breast deformity	330
10	No procedure	L-type brachioplasty	No procedure	Reduction mammoplasty with free nipple graft Type 1 breast deformity	200
11	No procedure	L-type brachioplasty	No procedure	Augmentation mastopexy with implants Type 3 breast deformity	190
12	No procedure	L-type brachioplasty	Lifting procedure	Total parenchymal reshaping Type 2 breast deformity	240
13	No procedure	Brachioplasty with posterior scar and Z-plasty over axilla	Tissue excised but not discarded	Autoaugmentation with spiral flap Type 3 breast deformity	250
14	No procedure	L-type brachioplasty	Lifting procedure	Total parenchymal reshaping and augmentation mastopexy (due to asymmetry) Type 2 breast deformity	230
15	Back-lift	L-type brachioplasty	Lifting procedure	Total parenchymal reshaping Type 2 breast deformity	270
16	No procedure	L-type brachioplasty	No procedure	Augmentation mastopexy Type 3 breast deformity	180
17	No procedure	L-type brachioplasty	Lifting procedure	Reduction mammoplasty inverted T with superior pedicle Type 1 breast deformity	220

Although this concept has several advantages, it also has some drawbacks. Obviously, a combined procedure increases the operative time because more than one operative step must be undertaken together with patient repositioning. Down time is increased, and the potential for

postoperative wound healing problems is elevated due to the more extensive tissue handling.

On the other hand, such an integrated approach has many more positive aspects. First, the number of operative steps required to reach the patient's goal is much smaller.

This means a reduced overall anesthesia time, rehabilitation, and leave of work. Usually, the patient with massive weight loss even requests combining more than one operative step without the surgeon needing to offer this possibility, especially if the patient has already undergone a procedure such as a lower body-lift. After seeing the results of the first body-contouring procedure, the patient cannot wait to schedule the next operative step in the overall treatment plan, at least in our patient experience. However, the patient's primary intention is to reduce the time span to complete all necessary operative steps to reach the desired body contour.

In our practice, we usually wait at least 3 months after a body-contouring operation to schedule the subsequent step. When, for example, three areas are corrected in a single operation that includes back-lift, brachioplasty, and breast reshaping, the theoretical time saving is at least 6 months. Thus, offering solutions that correct multiple areas in one operation is greatly appreciated by the patients.

However, this is not the only advantage of applying an algorithmic approach and combining operative steps into one single larger operation. The possibility of using autologous tissue is greatly facilitated when multiple operative steps in adjacent areas are combined. By correcting the rolls of redundant tissue on the back and lateral thorax, this tissue does not have to be discarded but can be pedicled and transposed anteriorly to autoaugment the ptotic or atrophic breast. If these back rolls are treated in an isolated fashion, as in a back-lift, the tissue usually is discarded and not available for subsequent breast procedures.

Hurwitz and Agha-Mohammadi [3, 14] described the possibility of using autologous tissue when performing lifting procedures in adjacent regions. However, no other report has emphasized the importance of possible tissue preservation when lifting procedures are performed for the patient with massive weight loss. Furthermore, it also makes sense to treat the upper arm–posterior axillary fold–lateral thorax as a single unit because correcting these areas in a single step likely will produce a superior aesthetic result.

By applying this algorithmic approach, the surgeon can customize the operative plan for treating the upper body of the patient with massive weight loss. Together with the patient, each operative step can be evaluated and included if necessary in the upper body-lift procedure. A further advantage is that the surgeon can definitely calculate the amount of time that the planned upper body procedure will require for the individual patient. As a rough guideline, an L-type brachioplasty and a back-lift add about 1 h of operative time to the procedure, whereas the individual breast procedures last from 1 h (augmentation) to several hours (augmentation with free flaps). Table 1 lists the

individual operative times for all the patients in the current series.

As a very valuable guideline, the Pittsburgh Rating Scale can be used to judge the individual deformities and possible procedures [16]. The first decision that must be made is whether to perform some type of back-lifting procedure or not. If such an operative step is to be included, patient repositioning during the operation from the prone to the supine position is necessary, automatically increasing the operative time. The clinician must keep in mind the possibility of using parts of this redundant back tissue for autoaugmentation purposes.

The next region that must be considered is area of the upper arms. Typically, an extended type of brachioplasty [8–10] must be planned to achieve satisfactory contouring. For very heavy arms, an additional option could be an initial debulking procedure with some type of liposuction to deflate the tissue and prepare the arm for a future lifting procedure.

The lateral thorax and the region just below the axilla must be considered next. If the patient would benefit from an excision of tissue, it should be planned accordingly. If autoaugmentation of the breast is planned, the tissue, perhaps even as an extension from the back, is not discarded but prepared leaving vascularity intact. If the treatment plan consists of simple excision in this region, it should be postponed until after completion of the breast shaping to prevent shortage of tissue during closure of the lateral breast wounds.

The breast is the region with the most options from which to choose. According to the aforementioned three basic breast types, the clinician must decide which operative procedure fits best for the individual patient. Especially if an augmentation is required and requested by the patient, the adjacent regions must be evaluated for the possibility of autoaugmentation. Otherwise, an augmentation using implants should be offered. Only in very selected cases and for motivated patients should an autoaugmentation with free tissue transfer be considered [17–21]. It should be noted that this procedure requires microsurgical expertise and prolongs a body-contouring procedure substantially. Typical donor sites in this specific clinical situation include the lower abdomen (DIEP flap), the inner thigh (TMG flap), and the gluteal region (superior gluteal artery perforator (SGAP) flap), all of which may be subject to excisional procedures during body contouring after massive weight loss.

Although the number of patients in this report is rather small and it is too early for long-term results, the presented surgical algorithm enables the plastic surgeon treating women with massive weight loss to plan optimally for surgical rejuvenation of the upper body. The algorithm should be seen as a helpful tool that can be discussed with the patient to achieve high patient satisfaction.

Conclusion

A comprehensive treatment algorithm to aid in planning upper body contouring for the woman with massive weight loss is presented. By following this algorithm, the surgeon can create a single-stage upper body-lifting procedure individualized for each patient. Several benefits, such as decreased overall treatment time and the possibility of using autologous tissue for breast augmentation, are the advantages of this approach.

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