”OVIDIUS” UNIVERSITY, CONSTANȚA

MEDICAL DOCTORAL SCHOOL

DOCTORAL DOMAIN: MEDICINE

DOCTORAL THESIS ABSTRACT

STRATEGIES AND TECHNIQUES IN BODY CONTOURING AFTER MASSIVE WEIGHT LOSS

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CONSTANȚA, 2014

CONTENTS

Key words: bariplastic surgery, antithrombotic prophylaxis, antibiotic prophylaxis, brachioplasty, abdominoplasty, ginecomastia, inner thigh lift, buttock lift.

GENERAL PART

Obesity as a health problem

Obesity is defined as excess fat accumulation in the body. It is quantified using body mass index (BMI) which is weight (in kilograms) divided by square height (in meters); normal weight means a BMI under 24.99 kg/m², obesity means BMI over 30 kg/m², morbid obesity means BMI over 40kg/m², with cases of BMI over 50 kg/m² being referred as superobesity. Romania has joined countries affected by this epidemic, with half of the population being overweight, and a third being obese.

Obesity is generated by a calorie intake that exceeds energy consumption, the balance being usually disrupted during a long period of time. Complex behavioral factors are implicated affecting food ingestion habits combined with a decrease in physical activity.

Obesity generates multiple comorbidities that put the subject's life in danger. Diabetes mellitus is one of the most important, being proved that weight gain is followed by higher insulin dosage. Cardiovascular diseases come into second place, including coronary heart disease, high blood pressure, cerebral strokes and venous system disorders. Respiratory function is affected with restrictive respiratory failure and sleep apnea, while the locomotor system is characterized by degenerative arthritis mostly of the lower limbs. Even malignancy is known to have a higher incidence in obese subjects [1].

Obesity has conservative or surgical treatment. The conservative treatment consists in radical changes in life style with lower food intake and more physical exercise (the latter having less practical impact). Subjects are helped by therapists and sometimes by medication like sibutramine or orlistat [2].

Surgical treatment of obesity is known as bariatric surgery and includes restrictive procedures (like laparoscopic gastric banding, sleeve gastrectomy, vertical gastrectomy with banding) or both restrictive and malabsorbtive procedures (Roux-en-Y gastric by-pass or biliopancreatic diversion). Bariatric surgery shows better success than the conservative approach, but the effectiveness is different among different procedures. Malabsorbtive procedures are better when it comes to maintaining the result by they generate nutritional deficiencies that need vitamin and protein supplements [3].

Surgical techniques in body contouring after massive weight loss

After massively losing weight, the subjects show major body deformities with contour deflation and impressive skin excess on the arms, thorax, breasts, abdomen, thighs or buttocks. Although based on classical operations, procedures that treat these deformities have specific elements that will be summarized below.

In treating women's breasts the surgeon should take into account the following: (1) glandular reshaping using sutures that confers firmness and a pleasant round shape

[4]; (2) keeping the position of the breast involves stiches to costal periosteum [4], pectoralis fascia or autologous dermal slings anchored to periosteum [5]; (3) self-augmentation techniques using deepithialised flaps from the axillar folds [4] or the abdomen [6] based on perforating vessels. All the techniques use the classical Wise design in treating skin redundancy. Augmentation/mastopexy using silicone implants does not give long time esthetic results in these patients.

Ginecomastia treatment involves areolar repositioning and some form of mastectomy. The areolar blood supply can be preserved on a deepithialised superior pedicle [7], or an inferior pedicle (deepithialised [8] or not[9]), but in some cases the areola has to be reattached as a free graft [8]. The resulting scars are almost horizontal and rather long.

The abdomen is an area of primary concern in massive weight losing population. The cure is abdominoplasty with or without liposuction in the upper lateral quadrants. Because of the supraombilical skin excess, a vertical excision that generates an inverted T scar is a specific modification [10, 11]. Some authors [10] limit the upper undermining replacing it with liposuction in order to preserve skin vascularity, mainly along the vertical limb of the suture line. At the same time with the abdomen, mons pubis ptosis or hypertrophy are addressed by planning the lower incision 6-7 cm above anterior vulvar commissure or the base of the penis [10], with liposuction helping in reducing bulk.

Inner thigh lift is a frequent operation, mainly in women. Due to a higher amount of skin and fat that need to be removed, a classical horizontal excision is not enough, so a vertical one is added generating an inverted L final scar [12]. The excision design is narrow in the upper part, avoiding anterior migration of the scar and a lower suture tension at the angle of the L. Liposuction may be a good adjunctive procedure.

Brachioplasty has its own specific elements. The excision must be extended in the subaxillary folds. There are two main approaches: one with the scar placed in the bicipital sulcus that traverses the axillar region with a posterior based triangular flap which is anchored at its top at the level of the delto-pectoral groove [13] or another that places the scar more posteriorly and continues with the excision along

the posterior axillary fold where a Z plasty is performed [14]. Some authors [15] perform liposuction around the excision, but this maneuver needs more expertise.

Combining abdominoplasty with lateral thigh lift and buttock lift has generated a circumferential lower girdle lipectomy that become specific to this type of patients. There are two main approaches: one starts with the abdomen, and then rotates the patient on both sides [16], the other starts with the patient on his belly and ends with the abdominoplasty [17]. Depending on the final scar position, multiple variations have been described [16-18], most of them having the same final result. In the buttock area a self-augmentation technique has been described using the deepithialised excised flap based on gluteal perforators [19].

Another procedure that is common with this kind of patients is an excision of the back rolls at the same time with breast surgery producing an upper girdle circumferential lipectomy [20].

A special feature of body contouring in massive weight loss patients is treatment of multiple zones during the same operative session, an approach that gives more quick results leading to better patient satisfaction.

PERSONAL EXPERIENCE

Our study has the following goals:

- Setting an approach algorithm adapted to patient's desire and Romania's conditions;
- Setting a minimal laboratory examination program that prevents complications: blood cell count, blood urea nitrogen, blood sugar, coagulation tests; in patients with malabsorbtive surgery, serum proteins should be monitored; we do not exclude cardiological examination, chest X rays in selected patients;
- Verifying the effectiveness and safeness of a thromboembolic prophylaxis consisting in fractioned heparins administration before surgery or 6-8 hours after surgery, then daily until patient is discharged;
- Setting the minimal conditions needed to approach more than one area in the same operative session: how long does surgery last, which is the required number of surgeons needed to keep the operative time under 6 hours;

- Setting a postoperative program that needs the minimum number of visits, a program that is suitable for patients living outside the city;
- Finding out how high is the complication rate and setting a treatment schedule for each type of complication.

Patients

Our study has 30 patients operated between January 2006 and September 2013 in two private facilities (Medsport, 4-6 Maior Coravu str. and Nordestetica, 24A Daniel Ciugureanu str., both located in Bucharest) and a public hospital (Clinical Emergency Hospital for Plastic Surgery and Burns, Bucharest) by the author. Inclusion criteria were: (1) weight stability for at least 6 months, (2) patients are healthy and able to face major surgery (clinically healthy, with blood tests consisting in cell blood count, blood urea nitrogen, blood sugar and INR within normal limits). We have chosen a minimal set of investigations because we didn't have any patients with malabsorbtive procedures. Patients Over 40 years old had also a cardiogram. There were 7 males and 23 women, with ages between 15 and 55, with an average of 33.13 years old. Patients have had an average of 18,32 kg/m² BMI drop: 6 after diet and exercise and 24 after bariatric surgery (6 laparoscopic gastric bandings and 18 sleeve gastrectomies). The average BMI on presentation was 28.41 kg/m², with only 5 patients having a BMI over 29.99 kg/m² at the time of surgery.

Results

6 patients had operations in only one area, the rest (24) having at least two areas operated in the first operative session. 10 patients had more than one operative sessions, with a maximum of 7 sessions in a female (including retouches performed under local anesthesia). The operations are summarized in table 1.

Table 1

Type of surgery	Number
Abdominoplasty	26
Lower belt lipectomy	1

Lipoabdominoplasty	1
Mastopexy or breast reduction Augmentation/mastopexy	8 2
Ginecomastia cure	5
Brachioplasty	4
Inner thigh lift	8
Lateral thigh lift	3
Buttock lift	4
Liposuction	4
Limited dermolipectomies	4
	Total: 70

The most frequent association of procedures was breast surgery in women/abdominoplasty (6 cases), followed by ginecomastia cure/abdominoplasty (5 cases), brachioplasty/inner thigh lift (4 cases), and abdominoplasty/inner thigh lift (4 cases). Abdominoplasty (when required) was performed in the first operative session, including one lipoabdominoplasty and a lower body lift. We will give details on each type of surgery, including relevant statistic data.

Brachioplasty was performed in 4 cases, each time in association with inner thigh lift. We have chosen a classical approach, without the modifications cited in the literature. Our excision has reached the apex of the axilla without unsightly or retracted scars. In one case the excision reached the forearm, and we performed a Z plasty in the elbow area. All the results were good, without any complications, excepting a temporary scar hyperpigmentation.

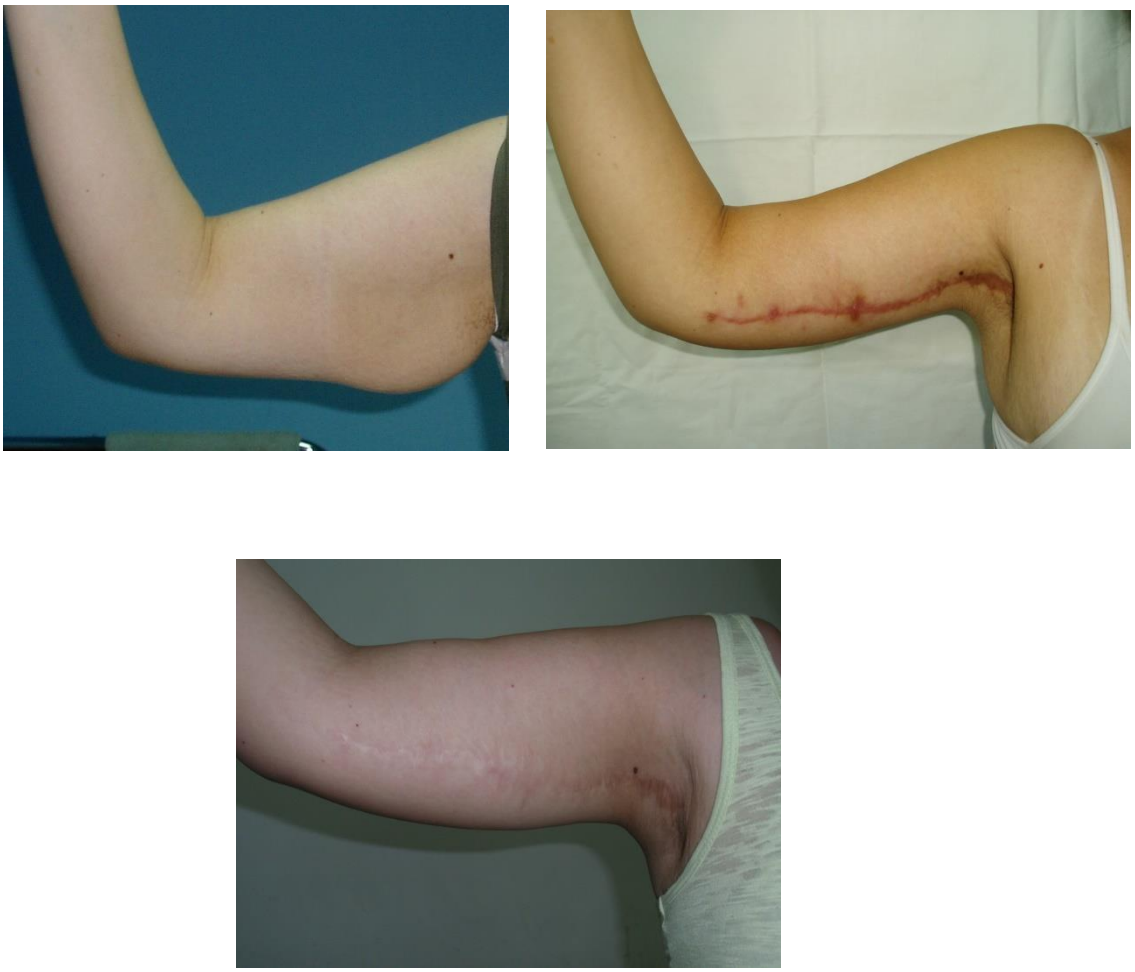

Figure 1. Example of brachioplasty with results at 6 months and 3 years.

Ginecomastia cure was performed in 5 cases in the same operative session with abdominoplasty. We have used a superior pedicle for the areola in 4 cases, with one case in which the areola was transferred as a free graft. This technique allows, in our opinion, for better areola placement, but in one case the areolas ended in a low position due to excesive traction on the abdominal flap. There were no complications for this type of surgery.


Figure 2. Example of ginecomastia cure on a superior areolar pedicle performed at the same time with abdominoplasty.

Breast reshaping in women was performed in 10 cases. In 8 cases we have performed a classical superior pedicle reduction or mastopexy (in 6 cases in association with abdominoplasty), and in 2 cases we performed augmentation/mastopexy with silicone implants. In 2 cases of breast reduction we had to deal with wound dehiscence that healed under conservative treatment. The augmentation/mastopexy cases have lost their result in time due to weight gaining and pregnancy. We did not perform any augmentation with autologous tissue because it was not needed or because the patients were heavy smokers.


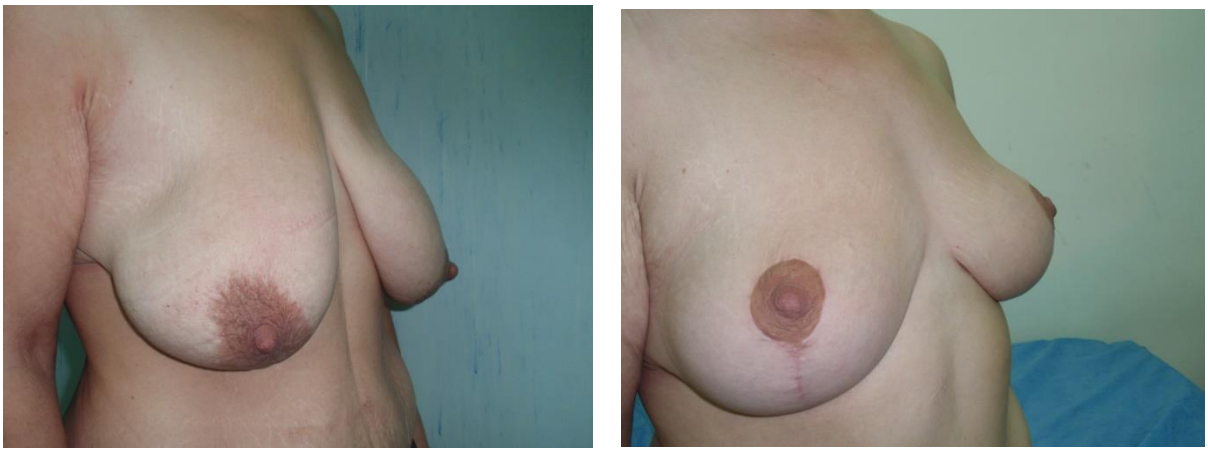

Figure 3. Example of mastopexy on a superior areolar pedicle performed in the same operative session with abdominoplasty.

Abdominoplasty was the most frequent procedure in our group (26 cases: 20 women and 6 men). In only 3 cases it was performed alone. We have associated abdominoplasty with other procedures: 6 breast reduction/mastopexy, 5 giencomastia cures, 4 inner thigh lifts, aso. With the exception of the cases in which we did breast surgery in women, abdominoplasty was performed before other associated procedures. We have used the classical approach, the vertical excision being refused by the patients, which is understandable in the era of laparoscopic surgery when every extra scar counts. During the undermining of the abdominal flap we have ligated some of the largest perforant vessels instead of using the cautery. In all female patients we have plicated the rectus fascia. For the umbilicoplasty we have started with an horizontal incision (that becomes oval on downward traction), but we have modified it lately into a T shaped incision with a short vertical arm in order to prevent retraction and obtaining a more pleasant shape (fig. 5). We have performed the cure of mons pubis ptosis and hypertrophy by placing the incision 6-7 cm above the anterior vulvar commissure or the base of the penis and we have tried to control the final scar position by placing nonresorbable stiches between Scarpa's fascia and the deep fascia. Abdominoplasty had the largest number of complication, which will be detailed in a distinct chapter.

Figure 4. Example of abdominoplasty performed at the same time with mastopexy (same case as in fig. 3).

Figure 5. Comparison between horizontal incision umbilicoplasty and T shaped incision umbilicoplasty.

Inner thigh lift was performed in 8 cases (7 women and one man). They were associated with abdominoplasty (4 cases) or brachioplasty (4 cases). In 4 cases we

have used the classica horizontal excision, and in other 4 we have added a vertical one, ending in a T shaped scar (not the inverted L described in the literature). Despite efforts to reduce thigh abduction on the operating table for better results, most of our cases had suboptimal corrections, which was at times observed by the patient too. In one case we had a seroma above the knee (probably a lymphocele) that was successfully treated with repeated needle evacuation and an anterior migration of the scar. We also had one case of vulvar distortion that did not required treatment.

Lower belt lipectomy and buttock lift were the less frequent operations in our group, with only one case for the former and 3 cases for the latter. Although circumferential lipectomies are specific for these patients, they were not requested maybe because patients were concerned mainly with their anterior view (what they see in the mirror). 3 patients noted the lateral and posterior body deformities after the abdominoplasty and we completed the circumferential lift in a different session. In 2 cases we have used liposuction for suture tension reduction and better contour control. All the cases had good results with improved firmness and correction of cellulite on the buttocks. We didn't use any augmentation technique for the buttocks because it wasn't needed or the available tissue was considered to be too small to make a difference.

Figure 6. Example of 2 stage buttock lift with progressive improvement in shape.

Liposuction is not specific for this kind of patients but it is a good adjunctive procedure. We have used it in 5 cases, in 3 of them in areas adjacent to the excisions (abdomen, lateral thighs, and buttocks) and in one case for the anterior cervical area. Liposuction reduces the suture tension allowing for larger amount of tissue to be excised and leading to better esthetic results. We regret we have not used largely form fear to compromise the vascularity of the flaps.

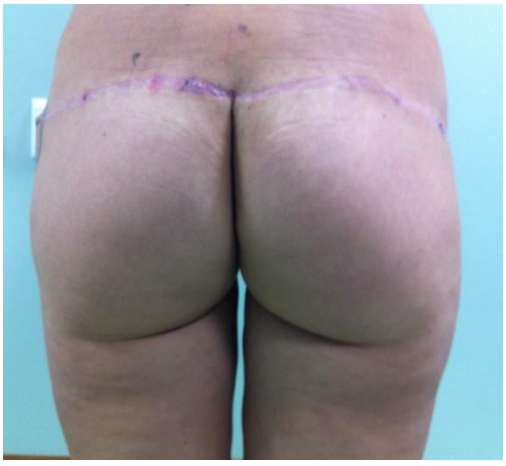

Figure 7. Liposuction and buttock lift showing contour improvement and cellulite fading on the buttocks.

Complications. They have a greater rate in massive weight loss patients because of their medical history, the length of the surgical procedures and the need to perform more than one surgery at the same time. We had surgical and esthetic complications. In the first group we had: 7 seromas, 9 cases of wound breakdown or limited necrosis, 4 major bleeding and 1 surgical infection. Seromas followed 6 abdominoplasties and one inner thigh lift, the general rate being within the literature data [21], which proves that early drain removal (at 48 hours) does not increase seroma risk. Furthermore, 3 of the abdominal seromas appeared after major bleeding when we kept the drains longer than usual. All the cases with wound healing problems were treated and cured with daily change of dressings by the patients. Major bleeding needed transfusion in one case (the female with lower body lift and hernia repair), the rest being treated with iron supplements. One case needed a surgical excision of an organized hematoma. The other hematomas were evacuated using needle aspiration, as they evolved like seromas. We have some concern regarding enoxaparin prophylaxis and major bleeding (we didn't have any significant bleeding in the nadroparin group), but the statistical data are not enough to draw a definite conclusion. Thromboembolic prophylaxis proved to be effective and we do believe that bleeding and its consequences are less dangerous and more easily treated than deep vein thrombosis. Our infection rate is within the reported limits [22], proving that our antibiotic prophylaxis program with a maximum of 3 doses is effective in preventing infection.

Esthetic complications were: 6 cases of underresection, 2 asymetries, 6 unsightly scars, one case of vulvar distortion and one case of low areola placement in men. 4 cases with underresection were treated with completion of the resection in 3 cases and liposuction in one case. 3 of these cases have followed bleeding and seroma which acted like expanders thus limiting the esthetic effect. The other complications did not need surgical treatment.

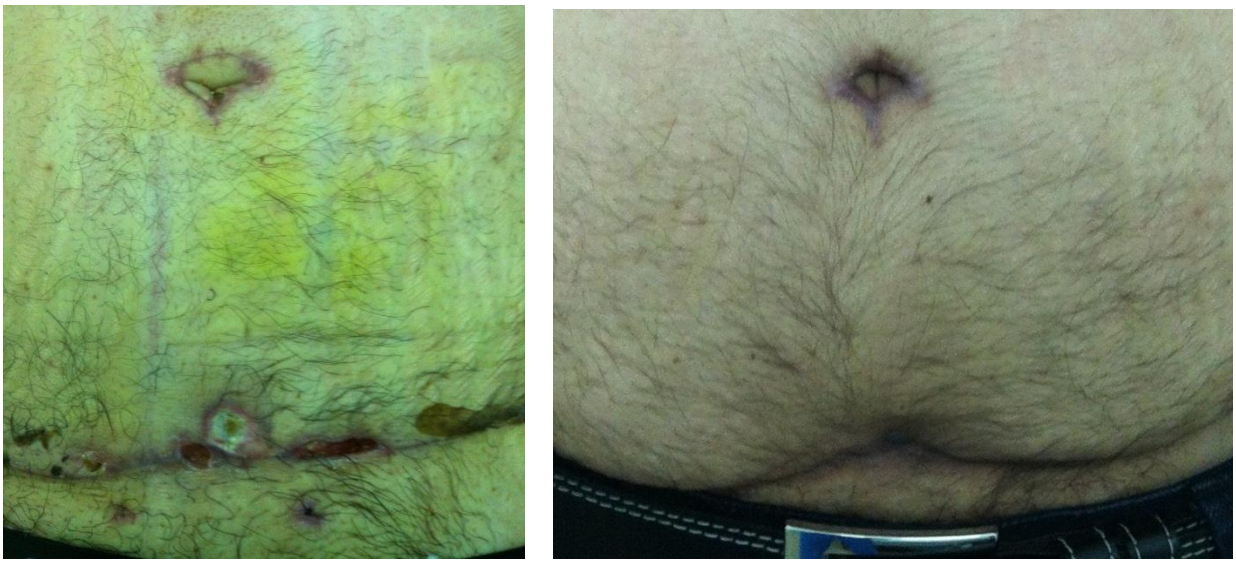

Figure 8. Wound breakdown and limited skin slough in a patient with abdominoplasty following major bleeding; healing under conservative treatment.

CONCLUSIONS. THERAPEUTIC GUIDE IN BODY CONTOURING AFTER MASSIVE WEIGHT LOSS

The elaboration of a guide was the main purpose of our study. We have tried to adapt it according to our expertise and in Romanian conditions. While some parts of the guide are not original, we included them in order to give coherence to this guide.

Case selection

Subjects that qualify for this type of surgery have to fulfill the following conditions: (1) at least 3 months of stable weight; (2) good physical and mental health in order to withstand major surgery; (3) while a BMI under 30 kg/m² is not mandatory, patients should be encouraged to get under this limit in order to lower the complication risk and to improve the outcome; (4) they must have the financial means because this kind of surgery is considered esthetic in Romania, therefore no reimbursements are expected.

Preoperative evaluation

<u>Clinical;</u>

Medical history of the patient must include: (1) which was the method they used in order to lose weight?; (2) how much weight did they lose ? (expressed as BMI drop); (3) if there are comorbidities that have not resolved after weight loss or are not medically controlled, so they may need further expert opinion (diabetes mellitus, cardiovascular disorders, aso); (4) does the patient has a strong motivation to follow the treatment and does he understand that staging it is important?; (5) does the patient have family and friends support both mentally and directly in helping with the postoperative care ?; (6) which are the main areas of concern for the patient that require treatment?.

Clinical examination should reveal elements linked to comorbidities, but is focused on body contour deformities that are to be addressed. Every area should be evaluated in terms of skin excess, fat distribution (excessive fat deposits should probably need liposuction), dermatological lesions around skin folds. There are classifications of these alterations in body contour, but they are not mandatory. Any asymmetry should be pointed out during the consultation because some form of asymmetry may persist after surgery.

The patient should meet the anesthesiologist.

Paraclinical evaluation:

We try to keep blood tests to a minimum: (1) blood cell count; (2) blood sugar (uncontrolled levels calls for a specialist consultation); (3) blood urea nitrogen; (4) coagulation tests (INR will suffice). More complex evaluation is needed if the patient had some form of malabsorbtive procedure (which is rare in Romania). Serology for HIV or hepatitis is important but does not affect surgical decisions if the diseases are already known.

Chest X rays may be important in Romania (which has a high incidence for tuberculosis), but subjects that seek esthetic surgery are seldom in the risk categories.

Cardiograms are thought to be useful for patients over 45 years old, but our group couldn’t provide reliable data on this matter.

If clinical examination reveals elements that suggest other illnesses further consultation with the specialist is needed, but this is seldom an actual situation

because they come to the plastic surgeon after they have the approval of the general surgeon and the nutritionist.

Choosing which areas to operate and staging

This is in general a matter of negotiation between patient's wishes and surgeon's experience. Our conclusions are:

1. Abdominoplasty is an area of primary concern and will be performed in the first stage, usually in combination with another procedure;

2. The breast area will be most frequently treated at the same time with abdominoplasty, both in men and women. During surgery, we consider to be better treating the breasts first in women, as we did not feel that the position of the inframamary fold is significantly affected by the traction on the abdominal flap. Inner thighs are a second choice to be performed in the first stage with the abdominoplasty;

3. Other areas (usually arms and inner thighs) are better treated in a second operative stage, which, being shorter, offers the possibility to do some retouches in the areas previously treated (mostly abdomen);

4. In some cases, lateral and posterior areas need treatment and they can be addressed in the second or third stage, completing the lower body lift;

5. Liposuction is a useful adjunctive procedure and should be used whenever seems necessary, as it does not prolong the operation significantly and helps in excising larger amounts of tissue.

Choosing location and setting the operating team

One of the most important conclusions of our study is that complex procedures for this kind of patients can be performed in private facilities, under standard conditions even in Romania. One important issue is that the surgeon should expect a 48 hour admission period which is enough even in complicated cases.

When complex operations are done at the same time, a team of 3-4 surgeons proved to be necessary. It consists of the senior surgeon and 2-3 residents or young specialists that have some expertise in closing surgical wounds. Careful planning

of the operating sequence is of utmost importance and can lead to operating times of under 5 hours even in combinations like breast surgery+abdominoplasty.

Preoperatively

Antithrombotic prophylaxis consists in administration of a fractionated heparin before the operation (2-4 hours) or (more frequently in our case) after surgery (at least 6 hours after the end of anesthesia). It can be continued with daily doses until the patient is discharged (usually 48 hours). There is no need to give the patient heparin at home. Patient should be encouraged to resume ambulation from the first 24 hours after surgery.

Infection prophylaxis consists in administration of a first or second generation cephalosporin (cefuroxima is our choice) preoperatively (half an hour before surgery), after 3 hours, and after another 3 hours if surgery lasts more than 6 hours. No other antibiotics should be given even if the drains are kept in place more than 24 hours.

Operative technique

Surgeons that operate on these patients should be experienced in body contouring classical techniques and should know the specific variants associated with massive weight loss. Most of the time, the latter are inapplicable (the patient refuses longer scars or doesn't qualify because he is a heavy smoker) and the surgeon should adapt his plan accordingly.

Continuous intraoperative evaluation of the resection, careful positioning of the patient on the operating table (skin and subcutaneous fat are very mobile), careful suturing of the superficial fascia and non-traumatic and tension-free closure of the skin (intradermal suture is of choice) are important elements that lead to good results.

Postoperative care

This stage should be as easy as possible for the patient with the lowest number of visits so that patients who live out of town can return home.

Admission time should not exceed 48 hours (this is possible even in cases with postoperative bleeding), a requirement that suits private clinics, but the patients

should mobilized out of bed during the first 24 hours. Non-bleeding cases can be discharged after 24 hours. Drains are usually removed on discharge in non-complicated cases, which makes it easy for the patient to change their own dressings.

Patients are instructed to shower daily and apply sterile dressings, which is safer if the wounds are covered with sterile adhesive bands. This adds to patient's comfort and spirit as they do not consider themselves ill. It also simplifies the surgeon's program and reduces both patient's and clinic's expenses.

The next visit is at 14 days when stiches are removed and knots on the skin are cut (when resorbable sutures were used, which is the recommended method). In non-complicated cases, this is the end of surgical healing, and the patient can return to a desk work. Patients with abdominoplasty or liposuction are instructed to wear the elastic garments for 1-2 more weeks. Exercise is allowed after 6 weeks.

Complications may change this kind of postoperative care:

-postoperative bleeding imposes drain keeping until drainage is less than 30 ml/day; the resulting seroma is evacuated with needle at 3-4 days interval; iron supplements for 3 weeks are mandatory;

-seroma is treated with needle evacuation at 4-5 days, and prolonged elastic pressure; surgical excision might be needed (seldom);

-wound healing problems are treated conservatively with daily wound cleansing by the patient and dressings with some anti-microbial ointment (povidone-iodine or Ag sulphadiazine 1%) until they heal; attempts to suture them secondarily are not suitable;

The program described above is rather new for Romania, as it gives the patient more liberty and more responsibility and takes the doctor off the factotum role

Complication management

Complications are far more frequent in this group. Their management should start at the preoperative visit when the patient should be warned about these risks, so that he/she will accept more easily the prolonged healing time that every complication generates. Male patients are more prone to complications.

Treatment of surgical complications:

-pure seroma is treated with needle aspiration every 4-5 days for 4-5 sessions;

-postoperative bleeding may need early surgery (seldom) or is treated conservatively with prolonged draining (until less than 30 ml/day); hematoma can be evacuated after 10 days (when it is liquefied) with a large needle or it will drain spontaneously through small fistulae in the surgical wound; they seldom need late surgery when they begin fibrous transformation;

-limited necroses or wound breakdown are treated conservatively with local cleansing with soap and water and antimicrobial dressings, a kind of care that can be performed by the pacient;

-surgical infection is probably and infected seroma or hematoma and needs surgical drainage and oral antibiotics for 5-7 days.

Treatment of esthetic complications:

-limited excisions under local anesthesia or during a future operative stage;

-liposuction under local anesthesia for small contour defects.

There is no need for hypertrophic or keloid scar treatment, as they seldom develop such scars. Scar hyperpigmentation is temporary and will resolve spontaneously.

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