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Dermolipectomies Following Weight Loss after Surgery for Morbid Obesity

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Background: Dermolipectomies play a major role in the functional and esthetic deformities which result from massive weight loss.

Methods: From June 1994 to June 2000, 148 morbidly obese patients underwent various bariatric surgical procedures. After at least 1 year, 33 patients underwent 51 regional dermolipectomies performed by the same plastic surgeon.

Results: All 33 patients underwent abdominal dermolipectomy. The average operative time was 194.2 min (110-420 min). The average amount of tissue excised was 2948.6 g (850-7525 g). 4 patients (12.1%) required blood transfusion. 6 patients (18.1%) developed complications, which included 1 case of postoperative bleeding, 3 wound infections and 2 skin dehiscences. Average length of hospital stay was 9.5 days (5-22 days). 15 of these patients (45.4%) simultaneously underwent abdominal incisional hernia repair; in 9 (24.2%), a Gore-Tex® mesh was used. In 2 patients the procedure was performed under emergency conditions due to small bowel obstruction. In 2 patients, simultaneous cholecystectomy was also performed. In 1 patient, a suction-assisted lipectomy of both thighs was necessary.

7 patients (21.2%) had mammaplasty, with average operative time 175.7 min (140-210 min). In 1 of them, breast implants were placed. There was no morbidity, and the average hospitalization was 6 days (4-9 days).

Flankplasty was done in 4 patients (12.1%), thigh reduction plasty in 4 patients (12.1%), and arm reduction plasty in 3 patients (9%). The average operative time was 302.5 min (160-420), 246.2 min (230-280) and 203.3 min (180-240) respectively. Average tissue excised was 1503 g (725-2400 g), 1342.5 g (1050-1550 g), and 572.6 g (400-848 g), respectively. Morbidity was related to wound infection in 1 patient, and persistent edema of the left lower extremity in another. 4 of these 18 patients required blood transfusion. Average hospitalization was 8.2 days (6-11), 8 days (7-9) and 6 days (5-7) respectively.

Conclusions: Regional dermolipectomies constitute the only available treatment for deformities following massive weight loss after bariatric surgery. Based on our experience, these procedures are safe, without serious complications and with good functional and esthetic results.

Key words: Morbid obesity, bariatric surgery, plastic surgery, dermolipectomies, abdominal dermolipectomy

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Introduction

Conservative treatment of the morbidly obese by non-surgical weight loss programs based on diet, exercise, drug administration and behavior modification continues to be non-effective over the long term. By contrast, bariatric surgery has been shown, in the vast majority of morbidly obese patients, to be effective in providing substantial and sustained long-term weight loss with minimum complications.[1] Following bariatric surgery and consequent loss of body weight and subcutaneous fat, the remaining skin has the ability to tighten to some degree depending on the patient's age and the amount of weight that is lost. Whatever tightening occurs, however, is usually achieved during the first postoperative year, and after this time any additional improvement is virtually impossible.[2] For this reason the remaining skin begins to sag, dramatically in some cases, in various regions of the body, forming skin-folds which cause serious

functional, dermatological and esthetic deformities. The regions of the body most commonly affected by excess skin tissue are the medial part of the arms, the breasts, the thoracic and abdominal wall, especially in the lateral areas, and the inner and outer thigh (Figure 1).

Patients who have already acquired an increased life-expectancy and a new outlook on life begin to feel the need for esthetic improvements in their appearance, to overcome feelings of inferiority and be able to become normal functioning members of society. In order to achieve this, it is essential that they undergo a series of one or more reconstructive surgical procedures.

Materials and Methods

From June 1994 to June 2000, 148 morbidly obese patients (BMI $\geq$ 40 kg/m^2) underwent various bariatric surgical procedures. Of these, 33 patients (22.2%), nine males and 24 females, 11 following vertical banded gastroplasty and 22 following Roux-en-Y gastric bypass, underwent 51 regional dermolipectomies performed by the same plastic surgeon (L.F) (Table 1). These procedures were performed after weight loss had stabilized and usually no earlier than 1 year following the initial bariatric surgery (average 26 months — range 10.5-85 months). Patient characteristics are shown in Table 2. One regional dermolipectomy was done in 24 patients (72%) and more than one procedure was done in 9 (27.2%). Given the fact that dermolipectomies require a long operating time and create extensive wounds with substantial blood loss, a time interval of at least 3 months is required between operations when more than one operation is performed. In some patients other surgical procedures were performed simultaneously with abdominal dermolipectomy (Table 3).

Table 1. Type of dermolipectomy

	No. of patients	(%)
Abdominal dermolipectomy	33	(100)
Mammaplasty	7	(21.2)
Flankplasty	4	(12.1)
Thigh reduction plasty	4	(12.1)
Arm reduction plasty	3	(9)

Table 2. Patient characteristics

	Average	(range)
Initial* age (years)	33.2	(18 – 51)
Current** age (years)	35.5	(19 – 53)
Initial* weight (kg)	136.9	(92.2 – 181)
Current** weight (kg)	85.9	(55 – 123)
Initial* BMI (kg/m^2)	51.2	(40 – 73.9)
Current** BMI (kg/m^2)	32.2	(22.3 – 46.9)
Change in BMI** (kg/m^2)	18.9	(10 – 34.1)

*Before bariatric surgery

**Before abdominal dermolipectomy

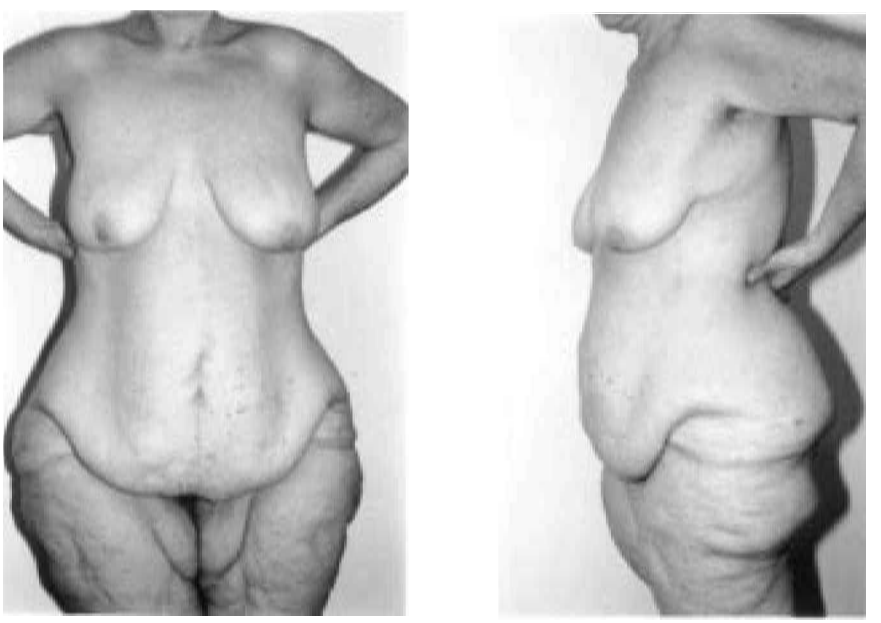

Figure 1. Patient with marked redundancy after 73 kg of weight loss following gastric bypass surgery.

Table 3. Operations performed simultaneously with abdominal dermolipectomy

	No. of patients (%)	
Obstructive ileus	2	(6)
Cholecystectomy	2	(6)
Revision of VBG to gastric bypass	1	(3)
Herniorrhaphy	6	(18.1)
Hernia repair with Gore-Tex® mesh	9	(27.2)
Gynecomastia	1	(3)
Trochanteric liposuction	1	(3)

Surgical Techniques

Abdominal Dermolipectomy

All patients chose this as their first operation. Our technique combines vertical and transverse excision. With the patient standing, the excess tissue is estimated along the vertical axis from the superior edge of the bariatric surgery scar, near the xiphoid, to the mons pubis. The area is outlined with two curved lines, with the concave facing the midline. The lines start at the xiphoid and diverge forming an inverted V. Subsequently, a transverse curved line with the concave facing up representing the final transverse scar, is brought to the mons pubis, joining the ends of the two vertical lines. In this way a triangular flap is created, which will be excised at the level of the muscular fascia after circumcision of the umbilicus and dissection of the stalk to the fascia. No undermining of the remaining lateral flaps is done. Following this, we repair the diastasis of the recti muscles, plicating the fascia from the xiphoid to the pubis in one or two layers with non-absorbable sutures. The wound is then closed in layers from the xiphoid, while pulling the lateral flaps medially and inferiorly in a V-Y fashion. Finally, the excess tissue (dog-ears) at the ends of the transverse incision is trimmed and the umbilicus is sutured to its new anatomic position. The final scar has the shape of an inverted T. In some patients, reduction of the mons pubis is also performed by wedge excision. Postoperative abdominal hernias, when present, were repaired with non-absorbable sutures followed by fascial plication. In patients where the defect was larger, a Gore-Tex® mesh was sutured to the fascia with nylon sutures.

Mammaplasty

Three types of procedures were performed:

Mastopexy

Taking into consideration the new anatomic position of the nipple-areola complex, the breast is outlined in a pattern. The area within the pattern is de-epithelialized, and the nipple-areola is sutured to its new position. Finally, the skin brassiere is sutured. The final scar has the shape of an inverted T.[3] In one patient, textured silicone implants were placed beneath the pectoralis major muscle at the time of mastopexy.

Breast Reduction

Reduction of the parenchyma and concomitant transfer of the nipple-areola complex is done according to the inferior pedicle technique. The final scar has the shape of an inverted T.[4]

Gynecomastia

Due to the extensive sagging of the skin, a breast amputation with free nipple graft was the procedure of choice. The final scar parallels the insertion of the pectoralis major muscle.[5]

Flankplasty

With the patient upright, we estimate the amount of tissue to be excised in the flank region. The excision is fusiform in shape and extends from the anterior to the posterior iliac spine, along the iliac crest. In cases where buttock-lift is performed simultaneously, the excision extends to the intergluteal sulcus. The excision is done at the fascia level anteriorly, and no undermining is done in the buttock area. We always repair the superficial fascial system with heavy non-absorbable sutures.[6,7]

Thigh Reduction Plasty

The technique we use combines vertical and horizontal excision. The vertical portion of the incision is over the posteromedial aspect of the thigh and extends from the groin to the knee, and the excision is done at the level of the abductors fascia. Care must be taken to preserve the saphenus vein whenever it is encountered. The horizontal incision is placed in the inguinal fold and is superficial, due to the presence of the lymphatics. The final scar has the shape of an inverted L.[8]

Arm Reduction Plasty

The incision line extends from the medial epicondyle of the elbow across the bicipital sulcus through the axilla and onto the lateral thoracic wall ending at the inframammary sulcus. In this way the scar is hidden when the arms are in the resting position. The plane of dissection is at the level of the muscular fascia except in the axillary area where it is superficial. Care must be taken to preserve the basilic vein and accompanying lymphatics.[9]

Results

The esthetic results of the regional dermolipectomies are shown in Figures 2-6. Operating time, hospitalization and amount of tissue excised are shown in Table 4. Following abdominal dermolipectomy four patients (12.1%) required blood transfusion. One patient (3%) required reoperation due to postoperative bleeding. One patient (3%) developed seroma requiring drainage. Three

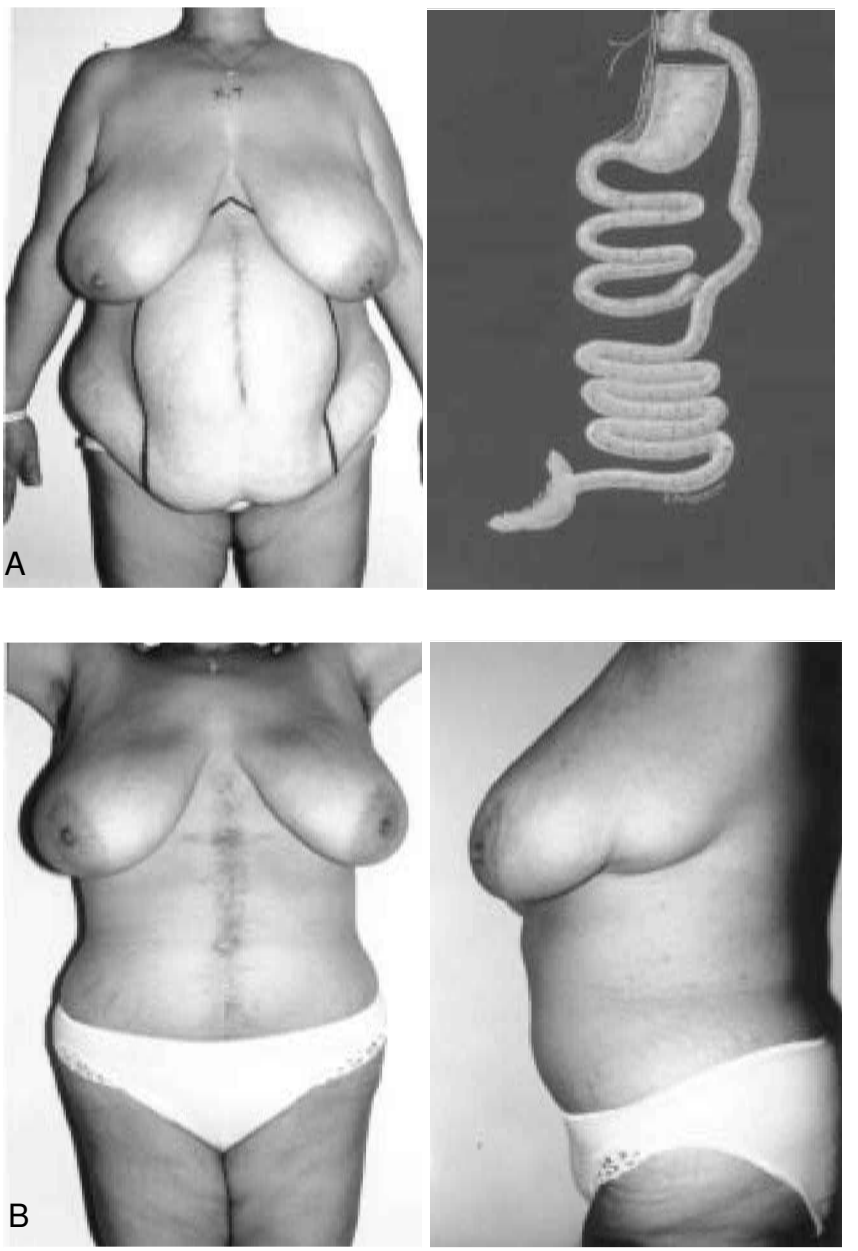

Figure 2. A. Patient after 34 kg of weight loss following vertical banded gastroplasty. Note the marking for vertical excision. B. Postoperative result after excision of 5400 g.

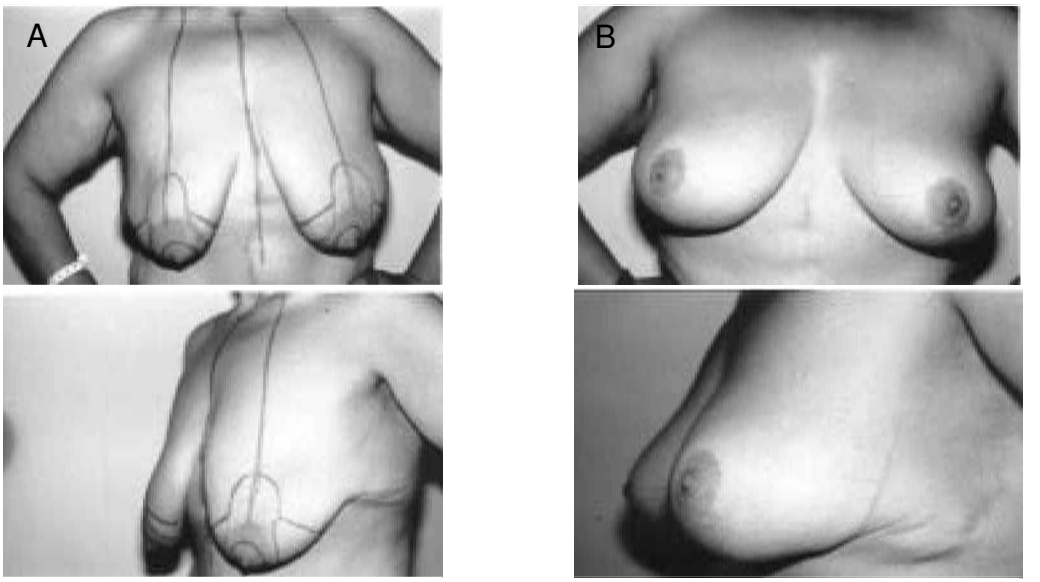

Figure 3. A. Patient with marked breast ptosis, 22 months after gastric bypass surgery and 58 kg of weight loss. B. Postoperative result a few months later.

Figure 4. A. Patient with lower body deformity. B. Markings for transverse flank-thigh-buttock-lift. C. Early postoperative result after abdominal dermolipectomy and mastopexy. D. Result 8 months later. Note the quality of the scar.

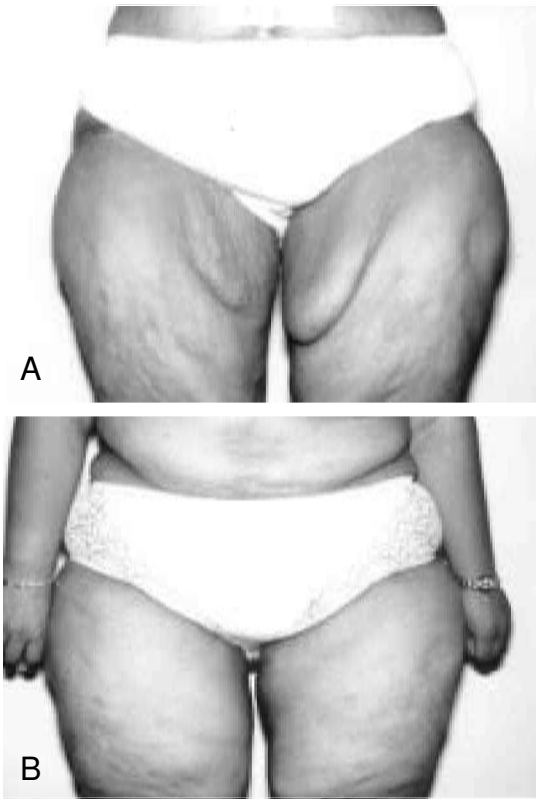

Figure 5. A. Redundancy of the inner aspect of the thighs. B. Postoperative result.

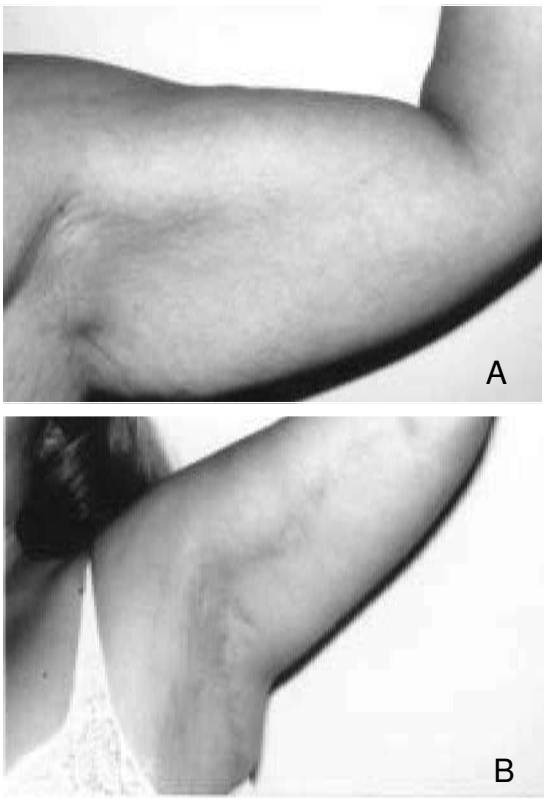

Figure 6. A. Female with bat-wing deformity. B. Postoperative result a few months later. The scar tends to be normotrophic.

Table 4. Operative Data and Hospitalization

Type of dermolipectomy	Operative time (min)	Amount of tissue excised (g)	Hospitalization (days)
	Average (range)	Average (range)	Average (range)
Abdominal dermolipectomy	194.2 (110-420)	2948.6 (850-7525)	9.5 (5-22)
Mammaplasty	175.7 (140-210)	1525 (1500-1550)	6 (4-9)
Flankplasty	302.5 (160-420)	1503 (725-2400)	8.2 (6-11)
Thigh reduction plasty	246.2 (230-280)	1342.5 (1050-1550)	8 (7-9)
Arm reduction plasty	203.3 (180-240)	572.6 (400-848)	6 (5-7)

patients (9%) developed wound infection. In two of these a Gore-Tex® mesh had been placed to repair incisional hernias. In one of these two patients the Gore-Tex® mesh was removed 15 months after surgery with no recurrence of the hernia 24 months later. The same practice is being followed in the second patient. In the third patient with wound infection, complete skin dehiscence occurred in the abdominal wound and was treated conservatively. Limited skin dehiscence occurred in one additional patient (3%) at the junction of the vertical and transverse incisions, and it was treated topically.

Following flankplasty, two patients (50%) required blood transfusion. One patient (25%) developed wound infection requiring re-hospitalization for 8 days. The infection was treated with drainage and antibiotics. The final esthetic result was not compromised. In another patient, a small sinus occurred due to a nylon suture and healed after removal of the suture.

Following thigh reduction plasty, two patients (50%) required blood transfusion. One patient had persistent edema of the left lower extremity, probably due to injury to the saphenus vein during surgery.

There were no complications associated with mammaplasty or arm reduction plasty.

The final functional result was considered very

good in all patients. The esthetic result was generally good and not adversely affected by the aforementioned complications (Figures 2-6). However, the scar size and quality was sometimes below our expectations. Scar widening also occurred in some cases causing many patients initially to express the desire for scar revision later in time. However, only one patient (3%) actually requested and had scar revision done.

Discussion

Reconstructive surgeons performing regional dermolipectomies use various techniques. Abdominoplasty techniques are classified, according to the direction of the excision and the resulting scar, as horizontal, vertical, or mixed.[10] The most widely used, for esthetic purposes, are the horizontal techniques with wide undermining up to the costal margin and umbilical translocation, the main reason being that the final scar is hidden in the bikini. In our series, we use a mixed technique for three main reasons: the existing vertical scar left from the previous bariatric surgery, easier access to incisional hernia repair, and the superior esthetic contour of the trunk and, especially, the waistline. Our technique is similar to the fleur-de-lis abdominoplasty in that no undermining is done and the final scar shape is an inverted T, but differs in the marking and execution.[11,12]

Some authors suggest a circumferential excision, which combines abdominoplasty and flankplasty, while others suggest a combination of two or more procedures performed simultaneously by a team of surgeons.[13-17] We have no experience with these procedures. However, they are very time-consuming and almost always require blood transfusion.

Regarding mammaplasty, the techniques that we use are well known and have passed the test of time.

For flankplasty, we use the transverse flank-thigh-buttock lift technique, which tightens the flanks and at the same time pulls up the lateral thigh and the buttocks, as an isolated procedure.[7] This technique does not have the disadvantages of Pitanguy's thigh-buttock lift, which was used as the standard procedure for many years, and may hold better in the long term than other, newer similar techniques, due to superficial fascial system repair with non-absorbable sutures.[7,18-21] The procedure is time-consuming (average 5 hrs), but the final result is impressive, leaving a narrow stable scar, hidden in the bikini. Inner thigh redundancy is corrected by semicircular, circular, vertical or combined circular and vertical excision.[22] The combined technique is more applicable in the massive weight loss patient because it elevates the skin of the thighs, and at the same time, tightens the skin in a circumferential manner.[8] To prevent inferior scar migration and lateral traction of the vulva, we suspend the horizontal portion of the flap to Colles fascia.[23]

There are also several techniques for brachioplasty. We use Pitanguy's technique, because it is the only one that treats both the arms and the lateral thoracic wall simultaneously.[9] In some patients who underwent dermolipectomies of the extremities, the initial scar was hypertrophic, but became normotrophic with time.

There are few studies of regional dermolipectomies following massive weight loss in bariatric surgery patients. The largest such study is that of Donati et al[24] involving 161 abdominal dermolipectomies and 99 other regional dermolipectomies over a 14-year period. The next largest study by Palmer et al[25] reports 55 regional dermolipectomies in 38 patients. Following that are some other studies involving a smaller number of patients.[14-17,26-29] Some authors agree that most complications occur following abdominal dermolipectomies, and, therefore, most of the studies refer primarily to these procedures.[24,25,30,31] Common complications include infection, seroma, hematoma, and skin necrosis, while serious ones include thromboembolic events.[30] Donati et al[24] report a mortality-rate of 1.2% due to thromboembolic events and a morbidity-rate of 22.3% due to wound infection, 3.1% due to seromas-hematomas and 2.4% due to skin necrosis. Incisional hernia repair was performed simultaneously in 54.6% of patients.[24] Palmer et al[25] reported one case of massive leg thrombosis after a thigh plasty and some cases of seroma, hematoma and marginal necrosis without any other specific data. From the remaining series involving a total of 96 patients, wound infection developed in approximately 1%, seroma

in 5.2%, hematoma in 2%, skin dehiscence in 2% and reoperation due to hemorrhage in 1% of patients.[14-17,26-29] A large survey was conducted by Grazer and Goldwyn[31] in which 958 plastic surgeons were questioned regarding their experience with abdominoplasties in general. It was found that in a total of 10,490 abdominoplasties, the rate of wound infection was 7.3%, hematoma-seroma 6%, wound dehiscence 5.4%, deep vein thrombosis 1.1%, pulmonary emboli 0.8%, and death due to pulmonary emboli 0.01%.

Comparing our results following abdominal dermolipectomy to the aforementioned series, it can be said that our rate of infection is similar to that of Grazer and Goldwyn[31] (9% vs 7.3%), as is our rate of skin dehiscence (6% vs 5.4%). The incidence of seroma in our series is similar to that of Donati et al[24] (3% vs 3.1%), whereas reoperation due to hemorrhage is similar to that found in the mixed group (3% vs 1%).[14-17,26-29] The number of patients in whom abdominoplasty was accompanied by incisional hernia repair is similar to that of Donati et al[24] (45.4% vs 54.6%). The frequency of incisional hernias is high in this patient population and treatment is problematic, especially in those requiring placement of Gore-Tex® mesh. In our series, two of the nine such patients (22.2%) developed infection.

Finally, Vastine et al[32] reviewed the records of 90 patients who had undergone abdominoplasty at a single institution. In this group of patients, 36 had previously undergone gastric bypass surgery. Interestingly, it was found that previous bariatric surgery appeared to have no influence on abdominoplasty complications. Based on these results, Vastine et al[32] suggest that the complications of abdominoplasty are directly related to the degree of obesity at the time of operation rather than the existence of any previous bariatric surgical procedures. Since our data are in close agreement with those of Grazer and Goldwyn[31] for general abdominoplasty in patients without previous bariatric surgery, our findings also support this suggestion.

In conclusion, regional dermolipectomies constitute the only available treatment for deformities following massive weight loss after bariatric surgery. Based on our experience, these procedures are safe with no serious complications and with good functional and esthetic results.

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