

A New Surgical Approach to Body Contouring

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Background: The success of body contouring surgery will largely depend on the correct choice and performance of the technique, and utilization of the necessary scientific measures. Thus, this study sought to highlight the combination and evolution of the abdominoplasty-assisted liposuction technique, while individualizing each case for the patient's benefit.

Method: We present a series of 188 cases from the past 3 years (2017–2019), using our modification to the surgical technique: performing 360-degree liposuction first, and then abdominoplasty in the same surgical time. We show our aesthetic results, surgical time, and complications, so as to compare them with the literature.

Results: Of the 188 cases, 184 were women (97.9%) and 4 were men (2.1%). In 11 cases (5.8%), we recorded 4 hours as a minimum surgical time and 8 hours in 16 cases (8.5%) as a maximum time. Regarding complications, hematomas were recorded in 1 case (0.5%) as the least frequent complication and seromas in 18 cases (9.6%) as the most frequent complication. The aesthetic results, although not objectively measurable, are flattering for both the patient and the surgeon, as shown by documented evidence (photographs) before and after surgery.

Conclusions: Our study supports favorable results. Modification of this technique has resulted in outstanding body contouring surgery. We hope this procedure can be reproduced because of its few complications and the pleasant results it yields. (*Plast Reconstr Surg Glob Open* 2021;9:e3540; doi: [10.1097/GOX.0000000000003540](https://doi.org/10.1097/GOX.0000000000003540); Published online 24 May 2021.)

INTRODUCTION

There are 2 options for body contouring surgery: liposuction and abdominoplasty. Liposuction removes fat and reshapes the silhouette. Abdominoplasty removes excessive skin and fat, and strengthens the muscles to improve contouring.^{1,2} Plastic surgeons have modified and combined both techniques.

In areas with flaccidity, loss of skin elasticity, abundant panniculus, and excess weight or a history of significant weight changes, a simple abdominoplasty may not be optimal. A previous liposuction provides a better body contour, as it obtains fatty tissue that will later be used to give

volume and contour other areas. It also makes the skin looser for the abdominoplasty. Therefore, a liposuction followed by an abdominoplasty is the best option.³

The concept of beauty evolves, and patients are demanding stronger lines on the hips and buttocks, along with a more defined waist. Liposuction and fat grafting have become irreplaceable tools for achieving beauty goals.⁴

Using these combined techniques, the plastic surgeon achieves a better cosmetic effect on both the abdomen and trunk, as a body unit.^{5,6}

The combination of both procedures was considered risky in the 1980s and 1990s, due to complications, as liposuction represented a danger to flap circulation.² Abdominoplasties have gained greater popularity in the United States, encouraged by outpatient surgery and anesthetic evolution, allowing for fast and safe recoveries.¹

The introduction of liposuction by Illouz⁷ along with torso liposuction revolutionized body contouring surgery. However, the greatest progress appeared in the surgery combining liposuction before abdominoplasty.

The first reports of liposuction and abdominoplasty unification date back to the 1990s^{8–10} although some early proposals suggested performing an abdominoplasty

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followed by a liposuction. In 2001, Saldanha¹¹ described a lipoabdominoplasty technique (liposuction with an abdominoplasty), via selective dissection of the abdominal flap, folding the rectus abdominis, resecting the infraumbilical skin, and repositioning the navel, similar to Illouz's abdominoplasty.¹² Lockwood proved there is no increase in complications in patients with liposuction combined with abdominoplasty.¹³ Heller described a total liposuction of the anterior abdominal wall, followed by abdominoplasty, without increased complications, observing less tension in the suture line, which favored healing.¹⁴

Several studies have been performed on the viability of abdominal flap vascularization, with a prior liposuction. Using Doppler echocardiography, Graf shows that 60% of the perforated vessels are preserved.¹⁵ Using the same method, Munhoz studied pre- and postsurgical cases for 3 months, concluding 81.21% of abdominal vascularization is preserved.¹⁶ These studies support that lipoabdominoplasty does not increase abdominal flap ischemia. The joint procedures are a formula for solving skin laxity, rhytidosis, abdominal lipodystrophy, and rectus abdominis diastasis; improving body contour; and eliminating excess skin resulting from massive weight loss.

Other controversial issues include embolism, thrombosis, fatty complications, and the potential induced by liposuction in the vascular supply of the abdominal flap.¹⁷

Huger describes the 3 vascular territories of the abdominal wall.¹⁸ Studies over the last 18 years have defined modifications in the technique, necessary for a safe and effective procedure (Fig. 1).^{8,12,14,19} Territories are defined as follows: zone I, from the xiphoid to the pubis between the lateral edges of the rectus abdominis; zone II, the trapezoidal area defined by the anterior superior iliac spine and the groin; and zone III, the lateral area of the abdomen and flanks^{20,21} (Fig. 2).

Matarasso described 4 regions that could be safely treated by liposuction when performed alongside abdominoplasty (Table 1), based on the blood supply that remains after flap elevation, suggesting a limited and cautious liposuction if combined with abdominoplasty. He observed that patients with vertical incision scars, abdominal flap weakness, and smokers had an increased risk of necrosis, when undergoing the combined procedure.^{8,19}

During abdominoplasty, zone II is traditionally removed. Therefore, this zone is considered irrelevant. Most of the blood supply in zone III remains the same after flap elevation. This is considered a safe area for liposuction. Blood supply to zone I is interrupted during flap elevation, and liposuction is not recommended in this area; this is the central part of the abdomen and, and would be the most advantageous area for liposuction if it were safe. Liposuction

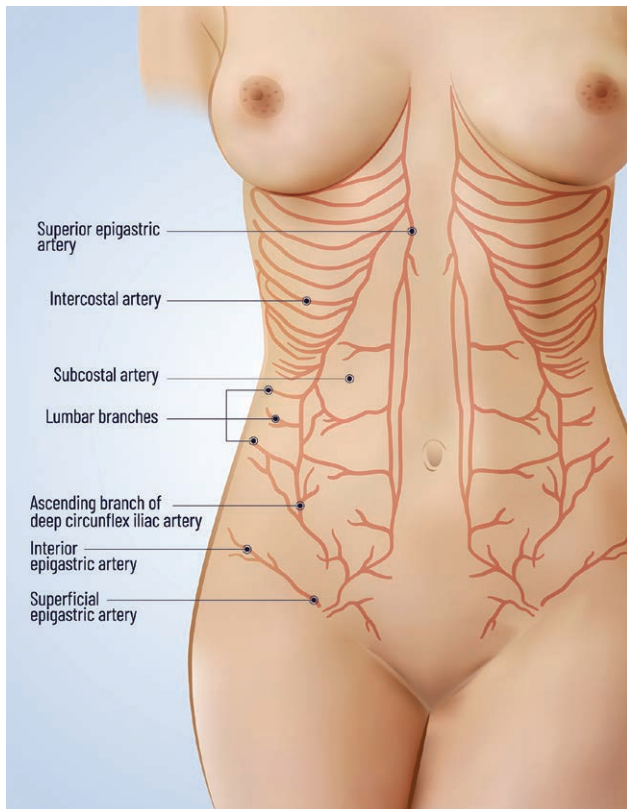


Fig. 1. Limited dissection technique. Collateral blood supply is provided by the lateral branches of the posterior intercostal arteries and by lumbar segmental vessels. Anastomotic connections exist between the superior and deep inferior epigastric vessels and between the superior epigastric and lateral intercostal arteries.

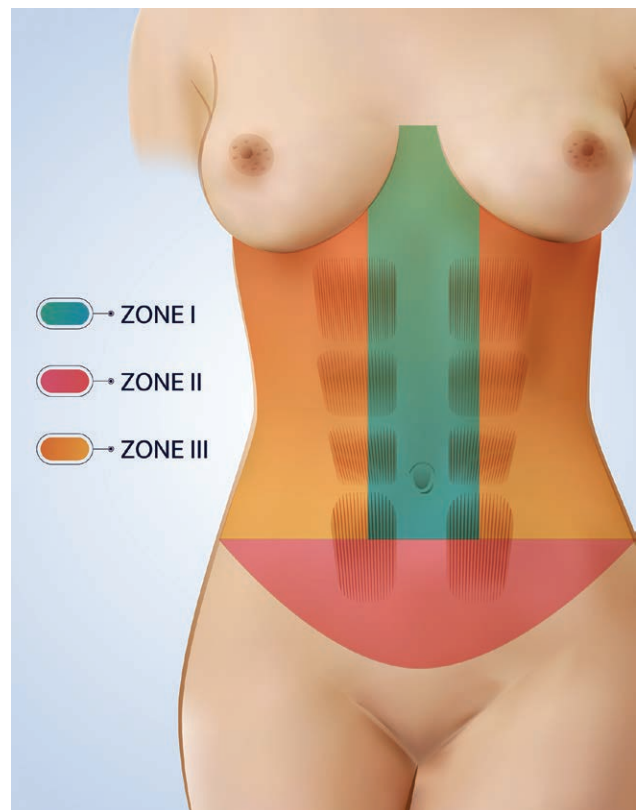


Fig. 2. Huger divided the anterolateral abdominal wall into three vascular zones. This figure represents the anatomic limits of each zone, previously described in the text.

Table 1. Matarasso’s Abdominoplasty Classification for Abdominal Soft Tissue Evaluation

Category	Skin	Fat	Musculoskeletal System	Treatment
I	Minimum laxity	Variable	Minimal flaccidity	Suction-associated lipectomy
II	Slight laxity	Variable	Slight flaccidity anterior abdomen	Mini lipoabdominoplasty
III	Moderate laxity	Variable	Moderate flaccidity anterior and superior abdomen	Modified abdominoplasty
IV	Severe laxity	Variable	Significant flaccidity lower and/or upper abdomen	Classic abdominoplasty with lipectomy and suction

is considered safe on the flanks (zone II and III), whereas zone I has a higher risk of devascularization (Fig. 3).^{19,22}

However, Matarasso considered that limited liposuction is safe in the area between zone I and III because the inferior phrenic artery branches remain after flap elevation.^{8,22}

If supply of zone I could be preserved, flap liposuction could be performed without any difficulties. There are consistent perforators that, if avoided during flap elevation, will provide zone I with sufficient vascularity to allow aggressive liposuction of the central flap after elevation.

The classic liposuction technique only contemplates removing the fat from the anterior part of the abdominal wall. In the “360-degree liposuction,” a more aesthetically pleasing body is achievable. The key to success is

performing anterior, dorsal and flank liposuction (circumferential), widely separating the abdominal flap up to the costal margins to join the incision at low tension and increase the aesthetic units with fat grafts as necessary.²³ To achieve this goal, the patient’s position is changed during surgery, from the supine, to the lateral and prone positions, modifying the surgeon’s perspective. This allows access to the entire anatomical circumference, achieving a better definition of the waist and the buttocks, which cannot be obtained only through anterior abdominal liposuction.^{24–27}

We have modified the liposuction and abdominoplasty technique in 2 fundamental aspects: (1) We initially performed liposuction and, later, abdominoplasty (opposite to the classic method where abdominoplasty was performed initially), and (2) We performed a 360-degree circumferential liposuction, for which we modify the patient’s position, to approach the body’s entire contour.

MATERIAL AND METHOD

A retrospective, observational, cross-sectional, single-center study was carried out to assess the aesthetic results and complications associated with body contouring surgery, using the modification of the traditional technique, first implementing 360-degree liposuction and, then, abdominoplasty. Inclusion criteria considered were patients over 20 years of age, both sexes, with a complete medical history, interested in liposculpture; exclusion criterion was patients under 20 years of age; and elimination criterion was patients interested in a procedure other than liposculpture, with body dysmorphic disorder. As elements of comparison, the body mass index, physical activity, smoking, alcoholism, chronic degenerative conditions, previous surgeries, aesthetic result, and the complications presented were recorded. General details on the data are presented in Table 2.

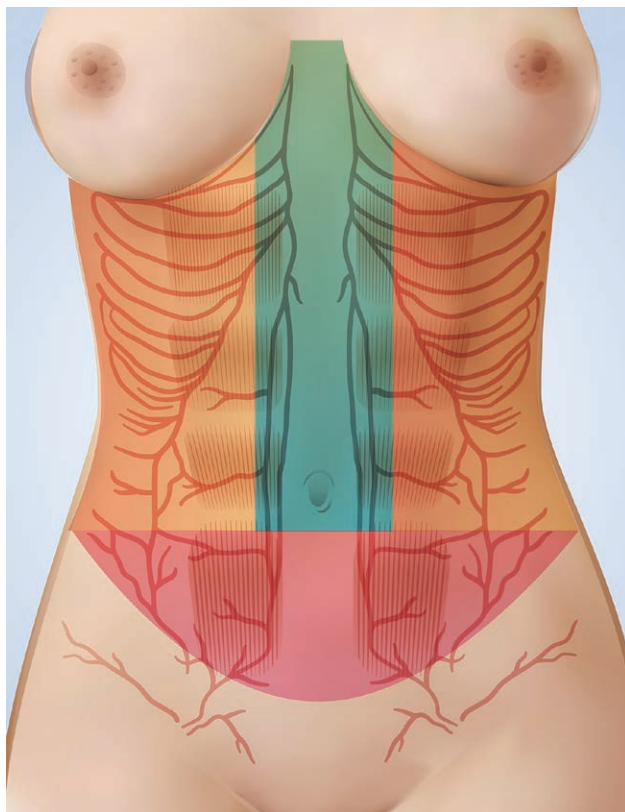


Fig. 3. Image showing the abdominal wall vascular territories described by Huger and the arterial irrigation of the abdominal wall. It divides the irrigation into three zones and names zone I the central abdominal region, nourished by the superior and inferior epigastric system; zone II is irrigated by the external iliac artery and superficial external pudenda, musculocutaneous and circumflex perforators; and zone III by the perforating and lumbar intercostals, responsible for flap survival during a tummy tuck.

Table 2. General Descriptive Table on the Data Presented in the Article

Gender	Women	98%
	Men	2%
Age (y)	42 ± 13.8	
BMI	28.5 ± 2.5	
Exercise status	Exercise	62%
	Sedentary	38%
Smoking	Yes	64%
	No	36%
Previous surgeries	Yes	8%
	No	92%
Matarasso	III	23%
	IV	77%
Surgical time (h)	6.09 ± 1.5	

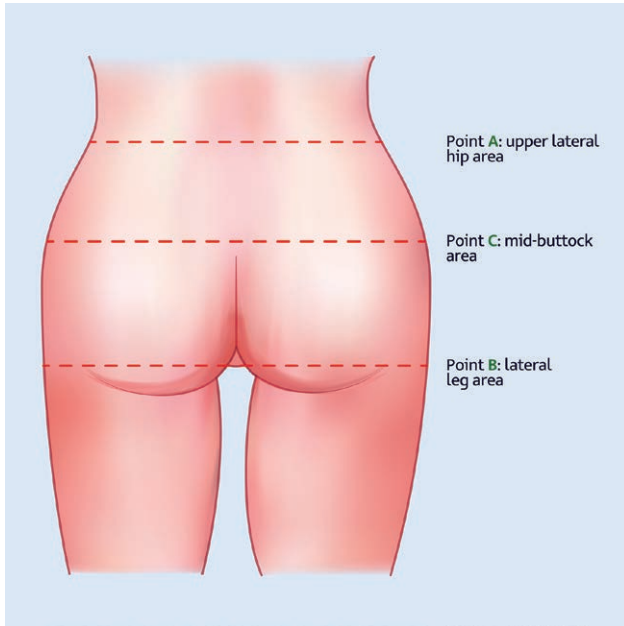


Fig. 4. Mendieta points diagram. Used in the body contouring procedure, by performing liposuction in areas with excess volume, and lipotransference to areas that lack gluteal volume.

Surgical Technique

The patient is marked while standing up. We marked the midline; lateral edges of rectus abdominis; and areas of fatty deposit on flanks, waist, and obliquus. Fat deposits are marked in the back region based on the Mendieta points (Fig. 4). (See Video[online], which displays the surgical technique step-by-step for providing more clarity to the reader.)

Once these liposuction and lipotransfer areas have been marked, abdominoplasty markings are made in the supine position: a horizontal line is drawn 5 or 6 cm away from the upper lips just above the clitoral hood. This horizontal line measures 5 cm on each side of the midline. Reference points are placed in the anterior superior iliac spine, and an ascending oblique line is drawn connecting with the horizontal line. This coincides with the excess skin rim in the inferior left side of the abdomen. Above the umbilical scar at its upper edge, another horizontal line is drawn, 6 cm on each side of the midline and connected with a descending oblique line, which in turn joins the previous oblique ascending line. These lines coincide in length. The resulting geometric figure is an irregular hexagon, allowing a more symmetrical closure on each side, as well as adequate flap compensation (Fig. 5). (See Video [online].)

Having the patient in the ventral decubitus position, we performed antisepsis of the anterior and posterior chest, along with arms and thighs, using iodine. Intermittent compression stockings are placed on both pelvic limbs, and we also placed the Foley catheter.

Infiltration is performed (1000 mL Hartman solution with 600 mg clindamycin, 500 mg amikacin, 1 g cephalothin, and 1 ampule of adrenaline 1 mg/1 mL) between 4000 and 6000 mL in total, to the areas to be liposuctioned (the Tumescence technique). Infiltration incisions are located in the groin, inframammary line, midline at

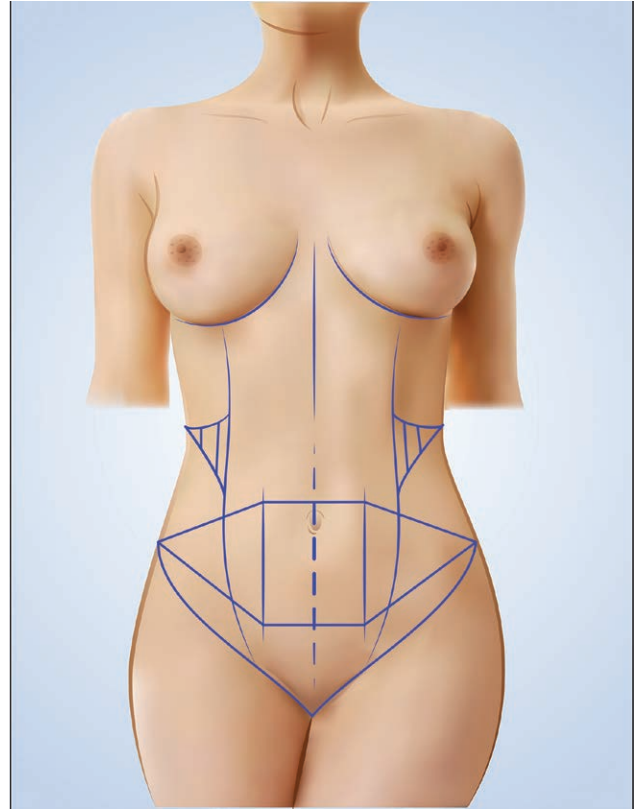


Fig. 5. Image showing the markings we make, with the patient standing up. The resulting geometric figure is an irregular hexagon, which allows for a more symmetrical closure on each side, as well as adequate flap compensation.

the level of the bra line in the posterior thorax, supra-gluteal, infra-gluteal sulcus, and intergluteal sulcus. The infiltration is initially made in the supine position. The patient is placed in the right lateral decubitus position, and we performed infiltration of the lumbar region, back, and arm. Later, the infiltration is performed in the left lateral decubitus, the lumbar region, back, and arm. After the infiltration, liposuction began, with a latency period of 15–20 minutes, with minimal bleeding rates.

Power assisted liposuction, connected to a closed system as a fat deposit, is used to recover fatty tissue. Liposuction begins in the anterior abdomen, initially at the edge of the left abdominal rectum, as well as the flank of the same side, and continues on the edge of the right abdominal rectum and flank of the same side. A supraumbilical midline marking is made directly on Huges zone 1, on Scarpa's fascia respecting the infraumbilical zone, once the flap has been compensated. Fat volume reduction is performed in the abdominal flap area, which will be removed with the abdominoplasty, again directly on Scarpa's fascia. Once this area is completed, the patient is placed in the lateral decubitus position and liposuction is performed in the lumbar area corresponding to Mendieta's point A, the axillary region, back and arm. If necessary, liposuction in Mendieta's point B is performed, and if required, fat is placed with 60-cm Toomey syringes with No. 5 single hole infiltration cannula in Mendieta's

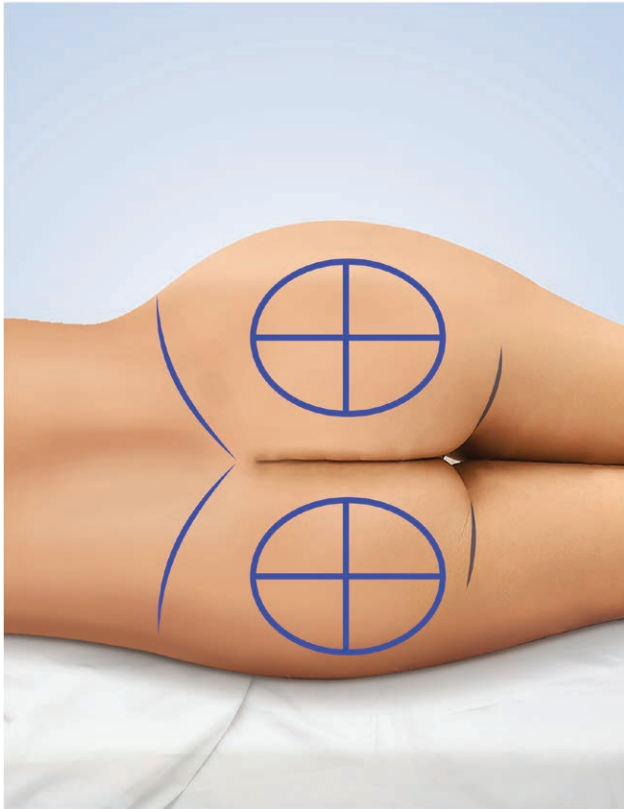


Fig. 6. The lateral decubitus position provides a better view of the Mendieta points mentioned in Figure 4. It helps determine whether liposuction is warranted in points A or B, or whether to perform a lipotransference to point C.

point C, as well as in the buttock. The same procedure is performed in the contralateral decubitus (Fig. 6). (See Video [online].) Subsequently, the patient is placed in the ventral decubitus position, and posterior liposuction is performed (derrière). This includes areas that still need to be regularized. We proceed to perform gluteal lipotransfer, procuring fat from quadrants of the maximum gluteal projection area. This infiltration is performed with 60 cm Toomey syringes with No. 5 single hole infiltration cannula. The average amount of fat extracted is between 2 and 4L in patients with a body mass index $< 28.5 \pm 2.5$.

Subsequently, we performed a dermolipectomy on the marked area. A flap dissection is made above the rectus abdominis aponeurosis and below Scarpa's fascia, on the infraumbilical zone over the previously marked area and on the supraumbilical up to the lateral border of the rectus abdominis, in order to respect the perforators of the deep superior epigastric.

We performed a rectus abdominis folding, toward the midline, with Prolene 1, in 2 planes: the first one with inverted X points, and the second one with suturing. Baroudi points are made in the supraumbilical midline (Fig. 7). (See Video [online].)

The flap is compensated, and simple points are placed as a guide in the midline and the terminations of each horizontal line. Edges are approached by planes, first through the closure of Scarpa's fascia with simple 3-0

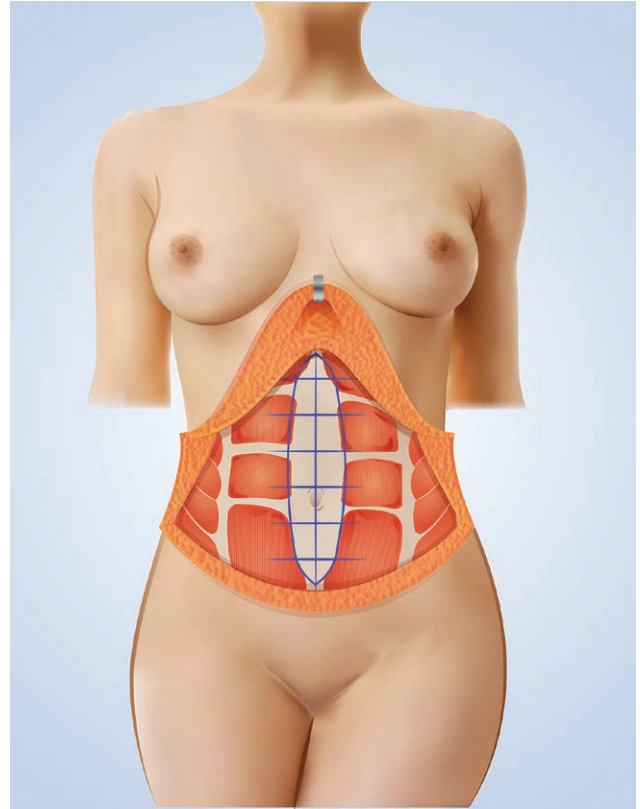


Fig. 7. Dissected abdominal flap with preservation of perforating vessels and Scarpa's fascia. The dashed blue lines represent the diastasis of the recto-abdominal muscles and the place where folding is done for their correct position.

monocryl; then via the dermis with simple, inverted, intradermal 3-0 Monocryl points; and, finally, in the skin, with inverted serger with 4-0 Monocryl. Previously, a drenovac 1/4 anterior drainage was placed in the groin on the right side and on the 1/8 posterior intergluteal incision, left for 7–15 days, withdrawing fat with counts of < 30 mL per day.

Immediate Postsurgical Results

After the procedure, the patient is observed for 24 hours with continuous monitoring of their progress (Figs. 8–10).

RESULTS

We have operated on 188 patients in the past 3 years (2017–2019), using our modification to the surgical technique. We performed 360-degree liposuction, followed by abdominoplasty, in the same surgical process. The aesthetic results obtained are better, the surgical time is acceptable, and the complications are comparable to those reported in the literature.

Of the 188 cases, 184 correspond to female patients (97.9%), and 4 to male patients (2.1%). The average age was 41 ± 13.1 years. In 8 cases (4.2%), the BMI was < 25 ; in 113 (60%), the BMI was 25 to 29.9; and in 67 (35.6%), the BMI was > 30 . An estimated 115 (61.1%) cases reported regular physical exercise. In 121 cases

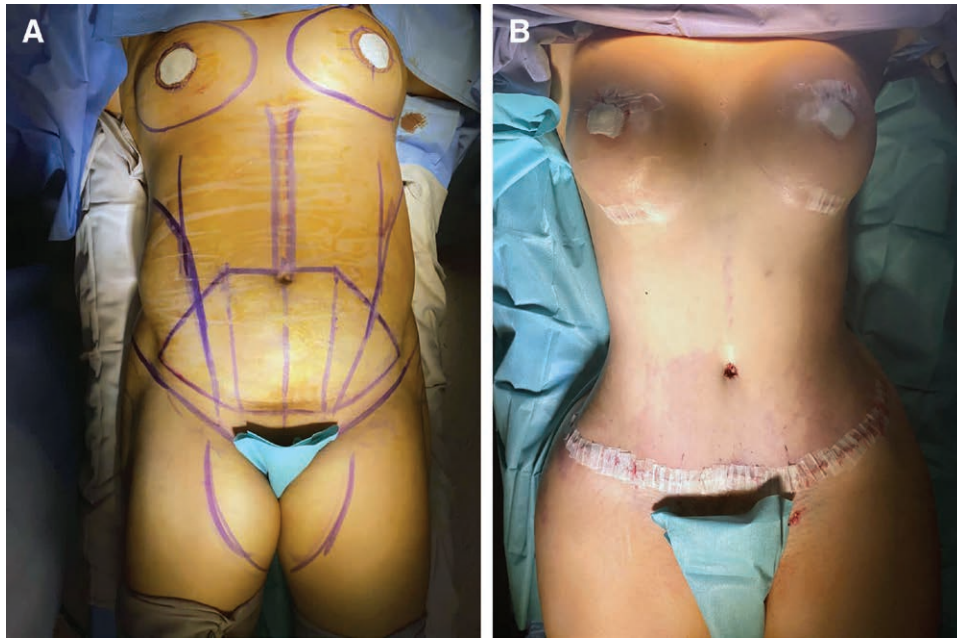


Fig. 8. Immediate postoperative results, patient 1. A, Presurgical view. B, Immediate postsurgical view.

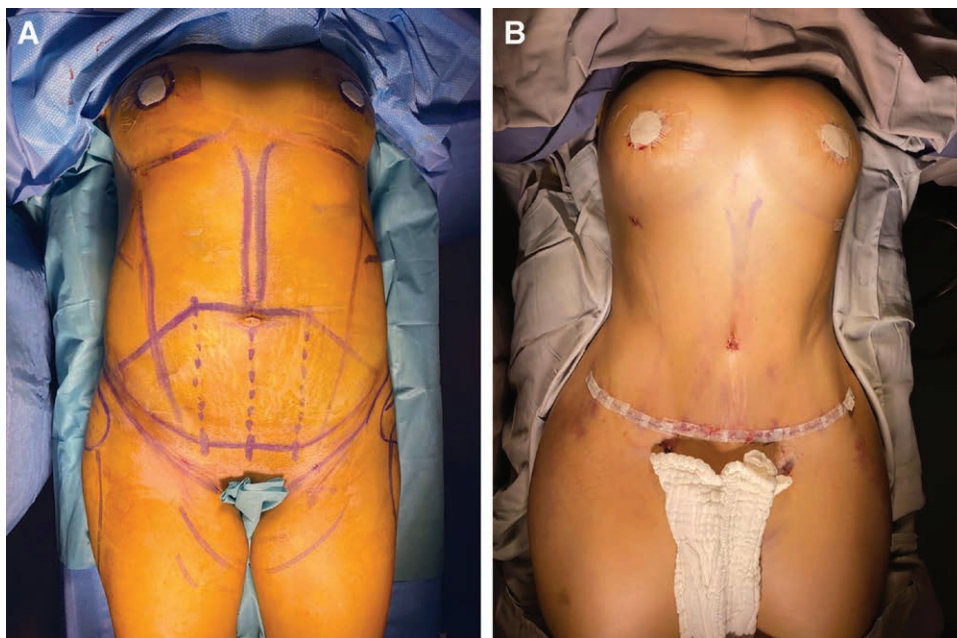


Fig. 9. Immediate postoperative results, patient 2. A, Presurgical view. B, Immediate postsurgical view.

(64.3%), active smoking was identified for which suspension was requested 1 month before the procedure and 2 months after it. Alcoholism appeared in 169 cases (89.8%), systemic arterial hypertension in 17 (9%), and diabetes mellitus in 5 (2.6%). In 15 cases, there were previous abdominal surgeries (7.9%). In total, 43 cases (22.8%) were classified as Matarasso grade III, and 145 (77.1%) as Matarasso grade IV.

In 11 cases (5.8%), we recorded a surgical time of 4 hours; and in 22 cases (11.7%), a surgical time of 5 hours,

in 109 cases (57.9%) 6 hours; in 30 cases (15.9%) 7 hours; and 8 hours were recorded in 16 cases (8.5%).

Regarding complications, hematomas were recorded in 1 case (0.5%), hypovolemia in 6 cases (3.2%), wound dehiscence in 5 cases (2.6%), skin necrosis in 3 cases (1.6%), seromas in 18 cases (9.6%), fibrosis in 11 cases (5.8%), sagging skin in 1 case (0.5%), an irregular wound in 3 cases (1.6%), and a pathological wound in 3 cases (1.6%) (Fig. 11). There were no cases of accidental intraoperative extubation, fat thromboembolism and

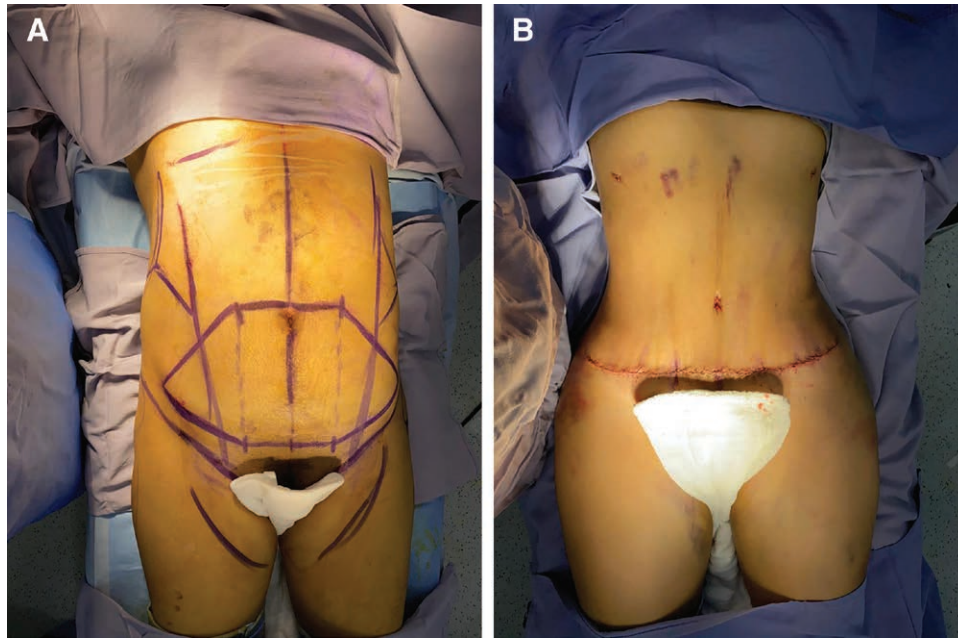


Fig. 10. Immediate postoperative results, patient 3. A, Presurgical view. B, Immediate postsurgical view.

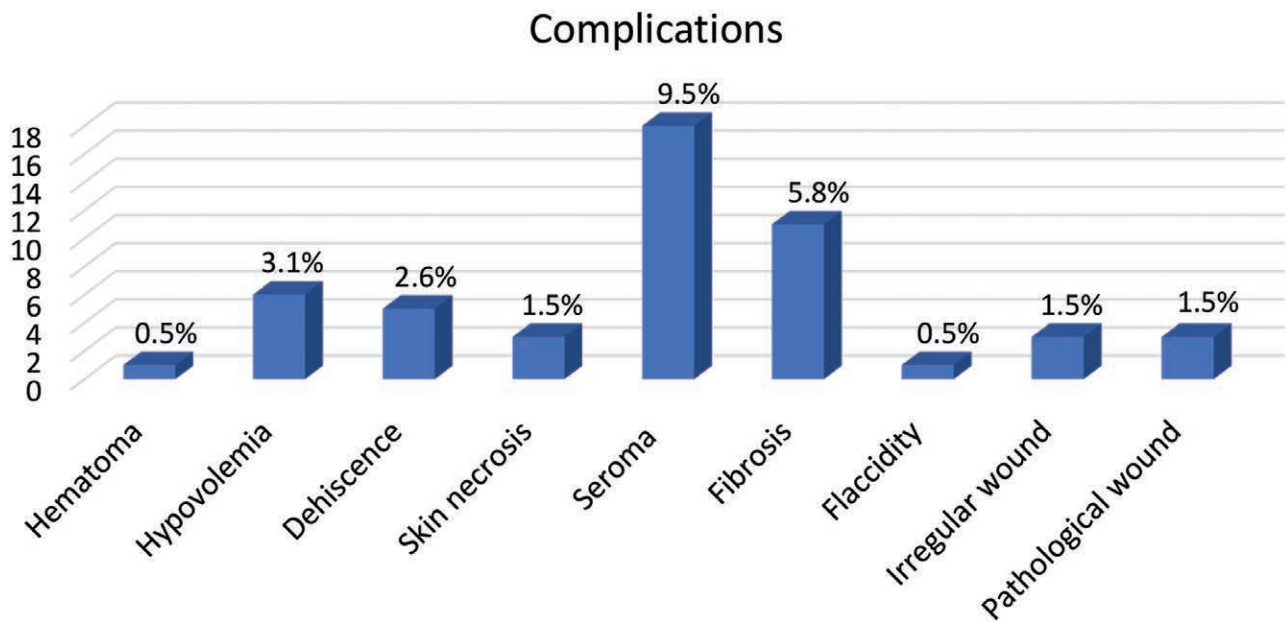


Fig. 11. Most frequent complication (seroma in 9.6%) and least frequent complications (hematoma and sagging skin in 0.5%).

pulmonary thromboembolism, ecchymosis at pressure sites, lesions due to nerve compression, or intraoperative vascular compression. There were no cases of surgical wound infection.

DISCUSSION

Combining these procedures is controversial. Single-phase procedures offer benefits such as faster recovery time, lower costs, greater patient satisfaction, and general benefits for the patients, but they can increase complications.^{28,29}

To ensure patient safety, the American Society of Plastic Surgeons issued evidence-based recommendations regarding decision-making matters.³⁰ These highlight 2 policy constraints: (1) the safety data are anecdotal or weak when considered as valid evidence to assist in creating practice guidelines; and (2) the safety thresholds for lipoaspirate volume remain unknown and unfounded.³¹

Literature confirms that 360-degree liposuction is safe though it involves higher volumes of lipoaspirate and, therefore, longer surgical times.^{32,33} In our series, only 8.5% required 8 hours of surgical time. However, the majority

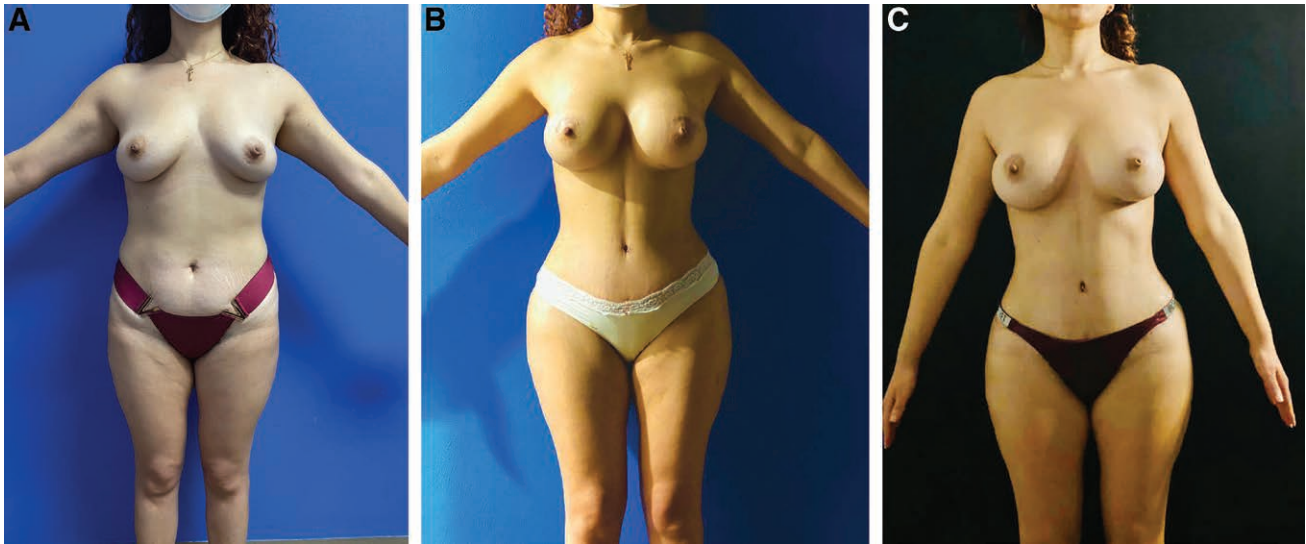


Fig. 12. Postoperative results. A, Preoperative photo. B, Postoperative at 3 months, patient 1. C, postoperative at 1 year, patient 1.

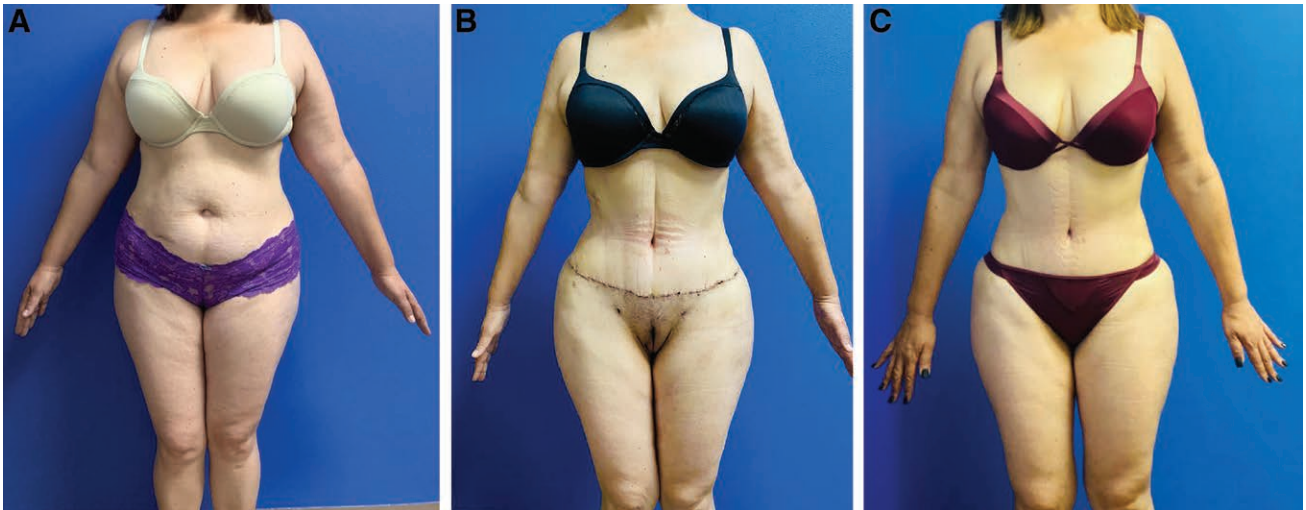


Fig. 13. Postoperative results. A, Preoperative photo. B, Postoperative at 3 months, patient 2. C, postoperative at 1 year, patient 2.

(57.9%) required 5 hours; the duration is related to meticulousness and experience. Nevertheless, there are some factors that can modify this duration, such as the patient's mobilization (which leads to greater caution with devices in the perioperative period) and the number of personnel required, depending on the patient (we suggest at least 3 people). The anesthesiologist is the supervisor, driving the patient's rotation in addition to controlling the orotracheal tube at all times, to prevent its exit. Simultaneously, the nursing staff controls the rest of the devices the patient may have.³⁴⁻³⁶ Body temperatures must be considered during long hours of surgery. The mean core temperature in healthy humans is 36.5–37.3°C. Inadvertent intraoperative changes in body temperature occur quite frequently. The incidence of inadvertent hypothermia (up to 90%) is much higher than hyperthermia. None of the existing guidelines specify the best device or site for temperature monitoring. Site and device selection depends

on the physician, the type of surgery, and the accessibility of the monitoring sites. The least invasive modality that provides a reliable assessment of core temperature should be favored. The guidelines of the National Institute for Clinical Excellence recommend temperature measurement 1 hour before induction, every 30 minute intraoperatively, every 15 minute in the post-anesthetic care unit, and every 4 hours in the ward or every 30 minutes, if active heating is required in the room. We followed these guidelines using forced air heaters, dividing the perioperative period into 3 phases: preoperative (1 hour before anesthesia), intraoperative (total anesthesia time), and postoperative (24 hours after entry into the treatment area and recovery in the operating room), always keeping the temperature above 36°C. Intravenous fluids and blood products should be warmed to 37°C using a fluid-warming device. The temperature of the operating room is the most critical factor that determines skin loss due to radiation,

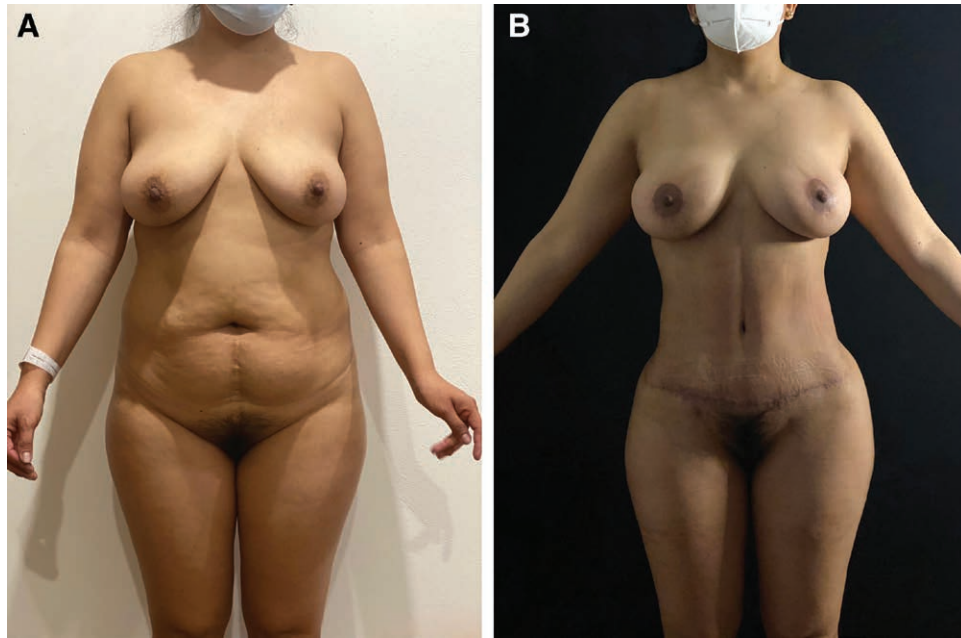


Fig. 14. Postoperative results. A, Preoperative, patient 3. B, postoperative at 3 months, patient 3.

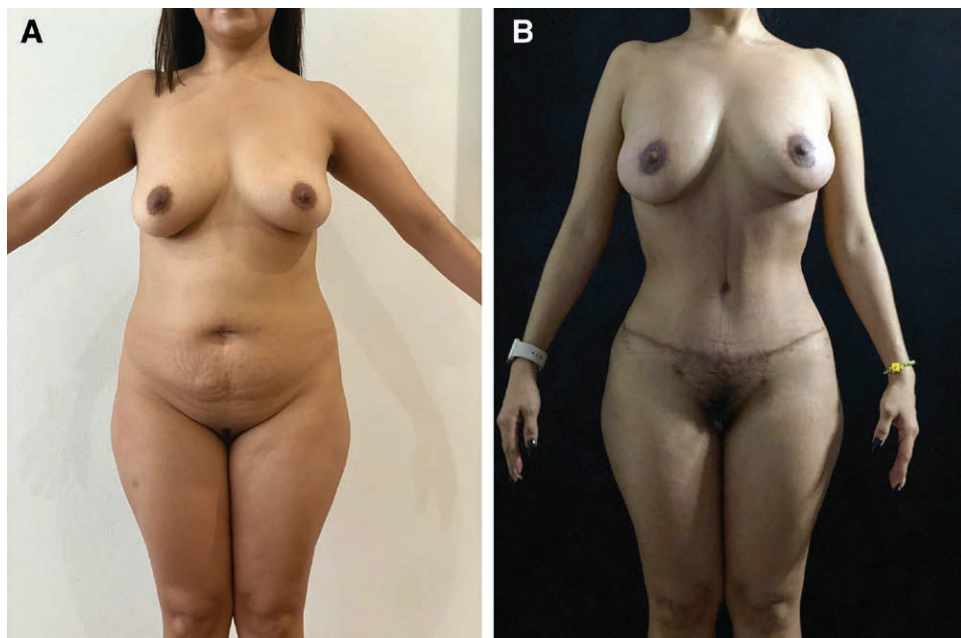


Fig. 15. Postoperative results. A, Preoperative, patient 4. B, postoperative at 3 months, patient 4.

convection, and evaporation. Increasing the ambient temperature is one way to minimize heat loss. Generally, an ambient temperature above 23°C is required. The Revised National Accreditation Board for Hospitals and Health Care Providers guidelines for operating room air conditioning suggest a temperature of 21°C ± 3°C and 55% relative humidity.³⁷

In this series, there were no complications associated with mobilization. However, to avoid these setbacks a well-established protocol must be followed, involving

well-executed and repetitive work over a long period of time.

The overall complication rate ranges from 0% to 10%, reporting the following: infections, skin necrosis, thromboembolic events, bleeding, and hollow viscus perforation, among others.³⁸

Some complications observed in lipoabdominoplasty are associated with thrombosis. The literature reports deep vein thrombosis rates in patients undergoing liposuction between 0% and 0.59%. However, this series

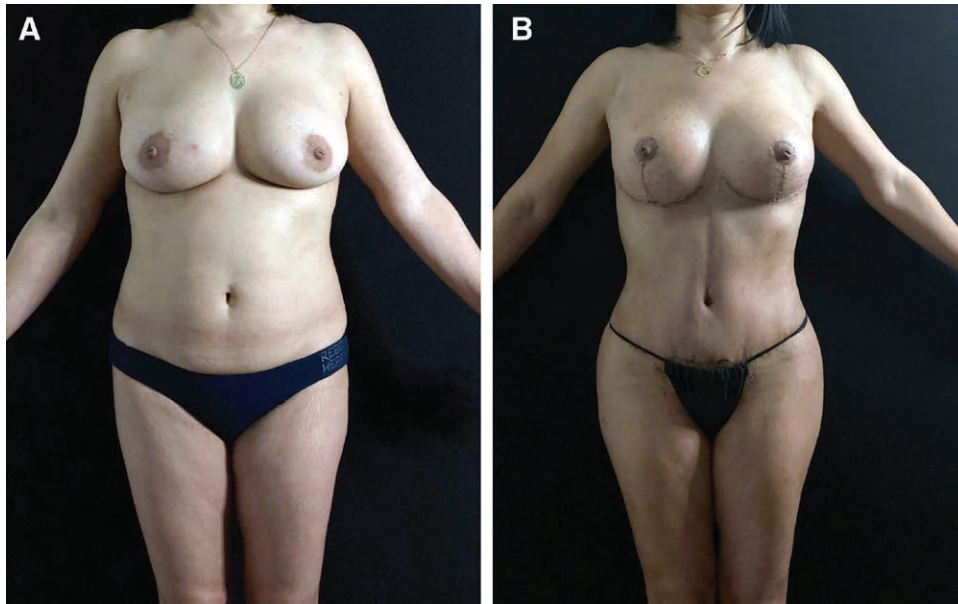


Fig. 16. Postoperative results. A, Preoperative, patient 5. B, postoperative at 2 months, patient 5.

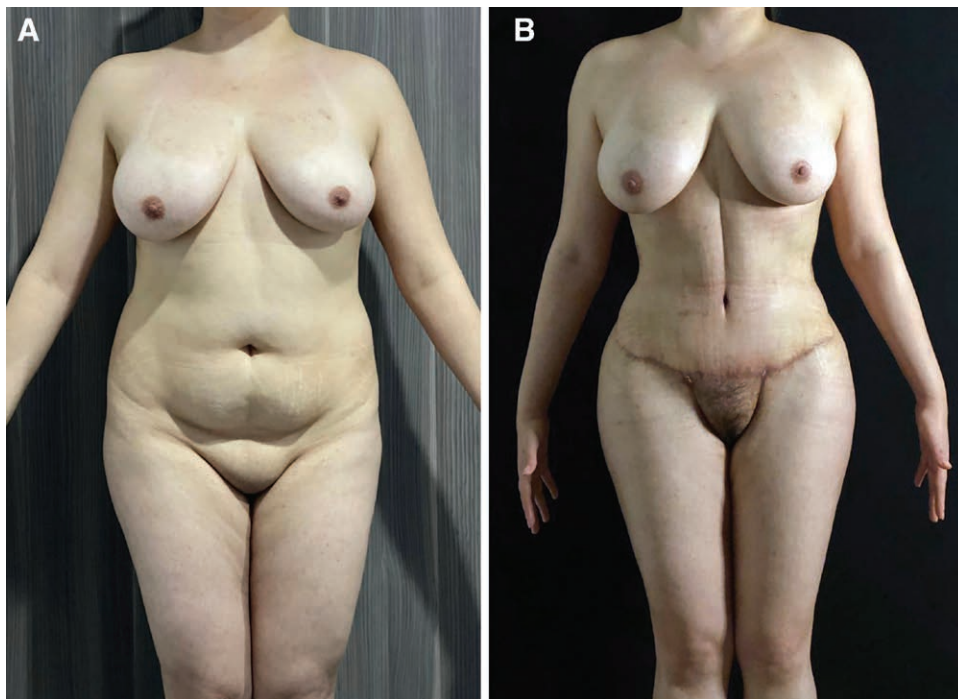


Fig. 17. Postoperative results. A, Preoperative, patient 6. B, postoperative at 2 months, patient 6.

demonstrated no cases, due to the appropriate management of anticoagulants, according to the Caprini scale, a reference point proposed by the American Society of Plastic Surgeons. Liposuction prevention guidelines were extrapolated from data generated by patients undergoing 60-minutes or longer body contouring procedures. For patients with a score of 3 or higher in the Caprini scale, the use of postoperative low molecular weight heparin or unfractionated heparin should be considered.³⁹

Complications in our series are low and similar to other validated 30-day records. We use this same period for monitoring surgical results.⁴⁰

Safety is based on not operating on patients with a 28.5 ± 2.5 BMI, no more than 6L of lipoaspirate per patient, and always liposuctioning the required areas.

All patients must undergo a detailed preoperative assessment for potential risk factors and comorbidities. It is fundamental to perform a physical examination with picture entries.⁴¹ Local complications such as hematoma,

seroma, wound dehiscence, and skin necrosis are recorded in 52% smokers and 32% nonsmokers.^{42–46} In our series, 64.3% were smokers. However, wound complications were <3%.

Complications regarding skin necrosis and wound dehiscence were treated with resection and placement of a negative pressure system. They delayed primary closure, but only 1 case required treatment via second intention closure. As for fibrosis, it is defined as the abnormal scarring of tissue, formed by excessive production of collagen, causing thickening and hardening of the treated area.

In a 2018 study of over 1000 consecutive cases, Sozer does not describe any cases of skin necrosis, with seroma being the most frequent complication. Comparing our description and results, they are very similar to those reported in the literature, emphasizing the preservation of perforators to avoid necrosis.⁵ Samra's study clearly states there is no statistically significant difference between smokers and nonsmokers in relation to complications.⁴²

Simultaneous liposuction and abdominoplasty result in better body contouring. Subcostal perforators supply less tissue, the abdominal tissue gains mobility, and lateral weakening is minimized, thus preserving better circulation to the flap. In terms of flap detachment, up to the costal margins, instead of a more conservative tunnel, a broader facial muscle folding is performed to achieve aesthetically satisfying lines, flatter upper abdomen, and better definition.

These results are permanent and provide an excellent solution, when compounded with a balanced diet and a regular exercise routine. Individual monitoring is essential; in our case, we carry it out for 1 year (Figs. 12–17). The patient must be aware that there will be a permanent almost imperceptible abdominal scar. Perception of aesthetics is assessed with pictures obtained in the pre- and postoperative period. This parameter cannot be measured accurately, but is evaluated through changes of regular habits (diet and exercise), clothes type and size, and the need for another aesthetic procedure (breast implants, rhinoplasty, etc.) to complement the patient's own perception of beauty.

CONCLUSIONS

In total, 360-degree circumferential liposuction followed by abdominoplasty provides better results. The key aspects for success are performing a liposuction on the entire trunk (circumferentially), separating the abdominal flap widely from the rib margins, closing the incision at low tension, and increasing the aesthetic units with fat grafting as needed. The results of the modified technique will be better, with less complications.

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