

# Lipoabdominoplasty: The Saldanha Technique

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## KEYWORDS

- Abdominoplasty • Lipoabdominoplasty
- Selective undermining • Abdominal wall
- Liposuction • Seroma

Most people are concerned about their physical appearance. When body contour shows aesthetic and functional deformity because of a genetic condition or as an acquired characteristic resulting from obesity, weight loss, pregnancy, or any other cause, the abdomen is one of the most frequently affected regions. Deformities may present as cutaneous flaccidity, localized fat accumulation, or diastasis of the rectus abdominal muscles, and this can lead to depression and loss of self-esteem.

Traditional abdominal plastic surgery results in a high rate of morbidity stemming from the necessity for a large undermining of the flap in which the perforating vessels are sectioned.<sup>1-4</sup> According to published evidence, these vessels represent 80% of the blood supply of the abdominal wall.<sup>5,6</sup> Consequently, the vascularity of the remaining flap is supplied by the intercostal, subcostal, and lumbar perforating branches, which are situated in the back and flank regions.<sup>7</sup> The occurrence of ischemic processes with tissue necrosis and dehiscence of the suture has been described when abdominoplasty is associated with liposuction.<sup>4,8</sup>

History shows that from 1899 to 1957 progressive undermining of the abdominal wall was performed. Thereafter, the extensive undermining was standardized by Vernon<sup>9</sup> to facilitate umbilicus transposition.

Since 1980, when Illouz<sup>10</sup> developed liposuction, and mainly in the last decade, the evolution of abdominoplasty techniques has motivated surgeons to search for innovations to decrease surgical morbidity and to obtain a faster recovery, a better body shape, low rates of complications, and a decrease in necrosis.<sup>11</sup>

In 1985, Hakme<sup>12</sup> presented a new approach for abdominal lipectomies, called miniabdominoplasty technique, consisting of liposuction of the abdomen and flanks, associated with elliptical resection of the suprapubic skin and plication of the supra- and infraumbilical muscles, without re-locating the umbilicus.

In 1991 and 1995, Matarasso<sup>8</sup> focused on the complications of combined liposuction and abdominoplasty, presenting 2 articles that recommended safe areas of liposuction. In those articles

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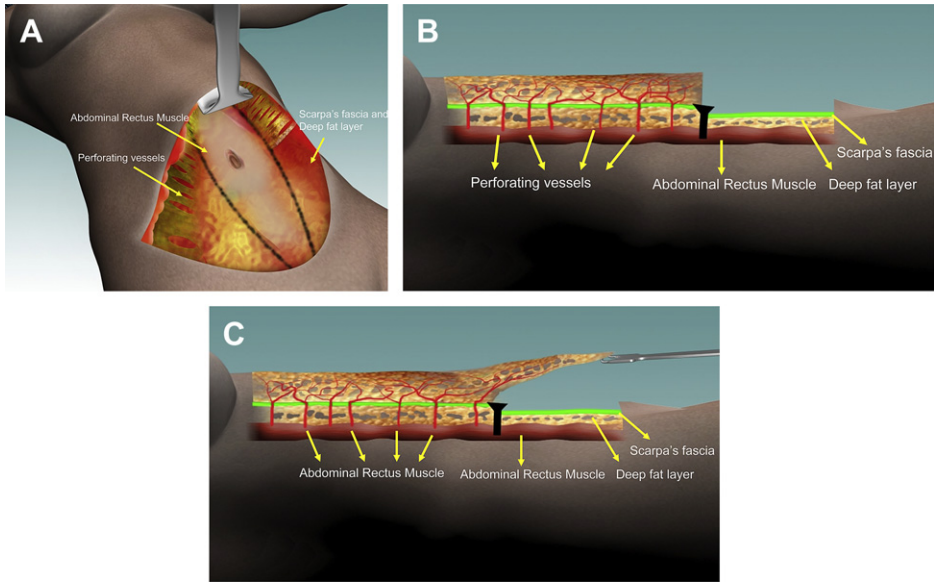
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**Fig. 1.** (A–C) Preservation of Scarpa fascia and partial deep fat layer in the lower abdomen to accommodate the abdominal flap.

he considered the back and the flanks safe areas, did not regard the lateral region of the abdomen as a safe area, and considered the central region of the abdomen prohibited for liposuction.<sup>3</sup>

In 1995, Lockwood<sup>13</sup> reported “high lateral tension abdominoplasty” in which he used Scarpa fascia to decrease the tension of the skin closure.

Since the 1990s, the undermining has decreased in extent because of the large number of complications (seroma, hematoma, and most of all, necrosis),<sup>14</sup> reaching zero in 1992 with the publication of “abdominoplasty mesh undermining” by Illouz.<sup>10</sup> The trend of abdominoplasty with or without small undermining continued up to 1999, when Shestak<sup>11</sup> presented the partial abdominoplasty method, with no undermining, associated with liposuction.

According to current records, lipoabdominoplasty was developed by Saldanha in 2000 and published for the first time in 2001<sup>15–18</sup> as a safe option to correct aesthetic and functional abdominal deformity while achieving better aesthetic results with technical simplicity for surgeons. In that publication, Saldanha standardized a selective undermining between the medial borders of the rectus abdominal muscles and used the term “lipoabdominoplasty” for the first time. Lipoabdominoplasty combines 2 traditional techniques, abdominoplasty and liposuction. The new and conservative concept is based on the preservation of the abdominal perforating vessels (subcutaneous pedicle), which are branches of the deep epigastric vessels.<sup>5–7</sup> This technique conserves about 80% of the blood supply of the abdominal



**Fig. 2.** Horizontal marking (12 cm).



**Fig. 3.** Initial distance from the pubis (6–7 cm).

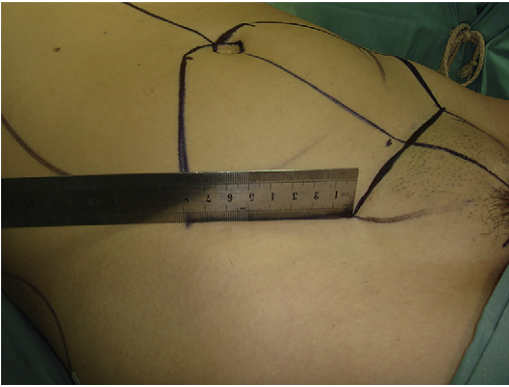


Fig. 4. Oblique marking (8 cm).

flap compared with traditional abdominoplasty. The lymphatic nodes and nerves are preserved, maintaining the cutaneous sensitivity of the flap to superficial pain and superficial touch caused by temperature, vibration, and pressure, which is an improvement on traditional abdominoplasty.<sup>15–18</sup>

### PRINCIPLES OF THE TECHNIQUE

Superficial liposuction described by De Souza Pinto<sup>19</sup> was one of the fundamental principles of lipoabdominoplasty because it facilitated implementation of the latter. This procedure gives

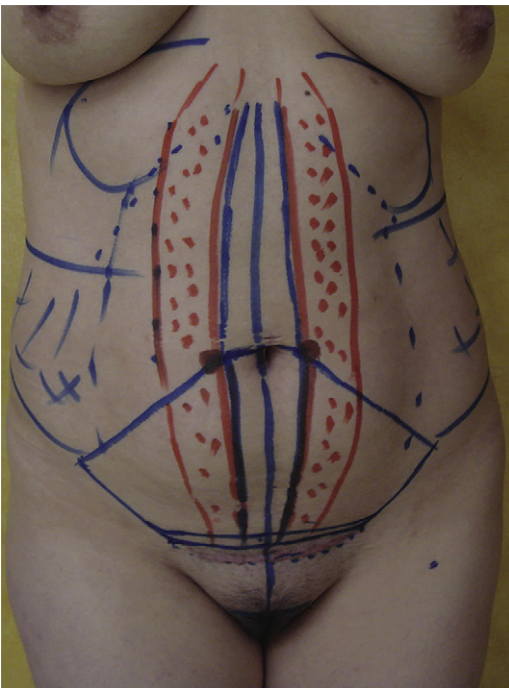


Fig. 5. Previous demarcation of diastasis.

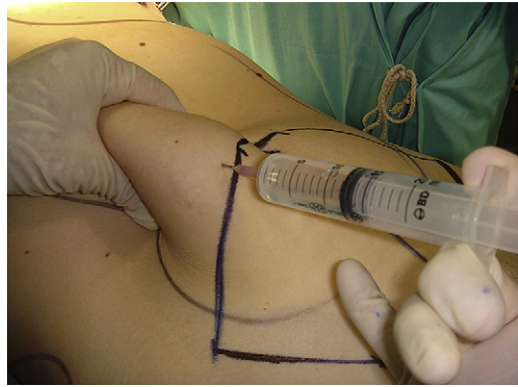


Fig. 6. Infiltration.

more mobility to the abdominal flap so that it can slide down easily and reach the suprapubic region.

The second principle is the anatomic study of the exact localization of the perforating abdominal vessels so that they can be preserved during the procedure. Using selective undermining, it is possible to conserve at least 80% of the blood supply of the abdominal wall, reduce nerve trauma, and preserve most lymphatic vessels.

Fewer complications are observed when compared with traditional abdominoplasty, including bariatric surgery. All patients with indications for traditional abdominoplasty may undergo lipoabdominoplasty.

### PHYSICAL EVALUATION

The principles of this technique can be used for any kind of abdomen presenting with flaccid skin, fat accumulation, and diastasis of the rectus muscle, but initially, to gain experience, it should be performed in patients with excessive flaccid skin and in those who are overweight, so that the surgeon develops confidence with this procedure. There is a short learning curve because surgeons are used to performing abdominoplasty and liposuction separately.



Fig. 7. Superior abdominal liposuction.





Fig. 8. Lower abdominal liposuction.

Ventral, lumbar, and femoral hernias should be ruled out. In the authors' practice, preoperative ultrasonography of the abdominal wall is routinely performed on all patients.

### Warning

- Previous abdominal liposuction could cause difficulty in the mobility of the flap.
- Previous scarring or an endoscopic procedure could permit the cannula to cross through the abdominal muscle aponeurosis.
- In borderline cases where it is not clear whether the proposed superior extent of resection can be reached, begin with a high suprapubic incision.
- Do not perform in patients with eventration.

### ANATOMY

Lipoabdominoplasty has aesthetic and reconstructive purposes. To achieve a complete reconstruction of the abdominal wall in the lower abdomen, the authors preserve Scarpa fascia and the partial deep fat layer in the lower abdomen (between the umbilicus and



Fig. 10. Resection of the infraumbilical skin.

the pubis). The procedure is completed when the superior flap comes down to the pubis (Fig. 1).

The undermining in the upper abdomen is performed exactly between the medial borders of the rectus muscles, corresponding to the diastasis area, preserving around 80% of perforating arteries, veins, lymphatics, and nerves, as shown by Munhoz and colleagues<sup>20</sup> in their study about comparative mapping evaluation in the pre- and postoperative periods. Their Doppler ultrasound study indicated that 81.21% of the perforating vessels mapped in the preoperative period were preserved postoperatively, which validates the hypothesis that this technique results in a lower percentage of complications caused by flap ischemia.

The rectus abdominal muscle and the skin are innervated by the anterior branches of the 6th to 12th intercostal nerves that run along the abdominal perforating vessels. Many studies indicate that the loss of sensitivity is significant after traditional abdominoplasty, but sensitivity is probably preserved when they undergo lipoabdominoplasty.



Fig. 9. The flap descent evaluation.



Fig. 11. Open liposuction.

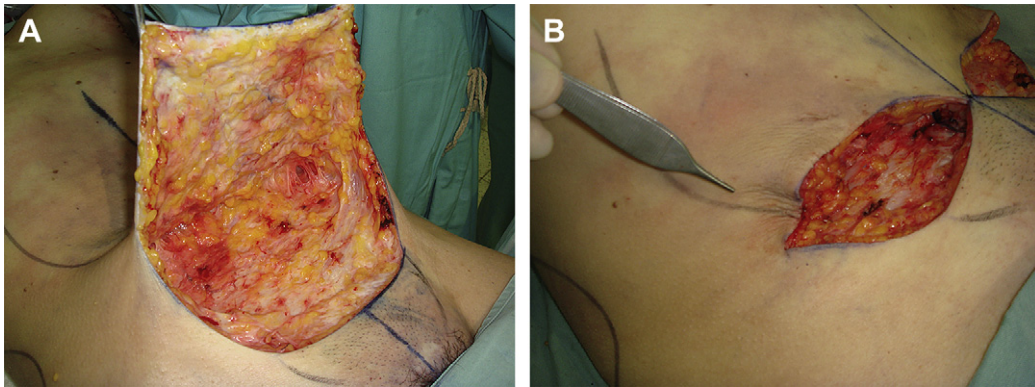


Fig. 12. (A) Scarpa fascia preservation. (B) Contentment of scars laterally.

## SURGICAL STEPS

### Marking

Marking is done by drawing a 12-cm horizontal suprapubic line that is 6 to 7 cm from the vulvar commissure (Figs. 2 and 3). Two oblique lines of 8 cm each are drawn in the direction of the iliac crest, completing the inferior incision line (Fig. 4). The abdominal flap and the liposuction areas are marked, including the dorsal region, when necessary. For better orientation at the beginning of tunnel undermining, the diastasis area is previously marked (Fig. 5).

### Infiltration

The tumescent technique is used by infiltrating the abdominal region with a 1:500,000 saline solution with adrenalin, using an average of 1 to 1.5 L of the solution (Fig. 6).

### Upper Abdomen Liposuction

The patient is placed in a hyperextended position on the surgical table so that liposuction can be performed safely. Liposuction begins on the

supraumbilical region with a 3- and 4-mm cannulas, removing the fat of the deep and superficial layers, extending to the flank as far as the submammary fold (Fig. 7). As in classical liposuction, the fat thickness is maintained to about 2.5 cm to avoid vascular impairment and contour deformities.

### Lower Abdomen Liposuction

Scarpa fascia is an important anatomic structure of the abdomen and should be preserved in lipoabdominoplasty. To facilitate its visualization and its preservation, the superficial fat layer and part of the deep layer need to be aspirated in the lower abdomen using a 6-mm cannula (Fig. 8). After evaluation of the flap mobility and descent (Fig. 9), umbilicus isolation and total resection of the infraumbilical skin are performed, as in traditional abdominoplasty (Fig. 10). If necessary, complementary open liposuction is performed to remove fat above and below Scarpa fascia and to create a homogeneous surface to accommodate the superior flap, which becomes thinner in its descent (Fig. 11).

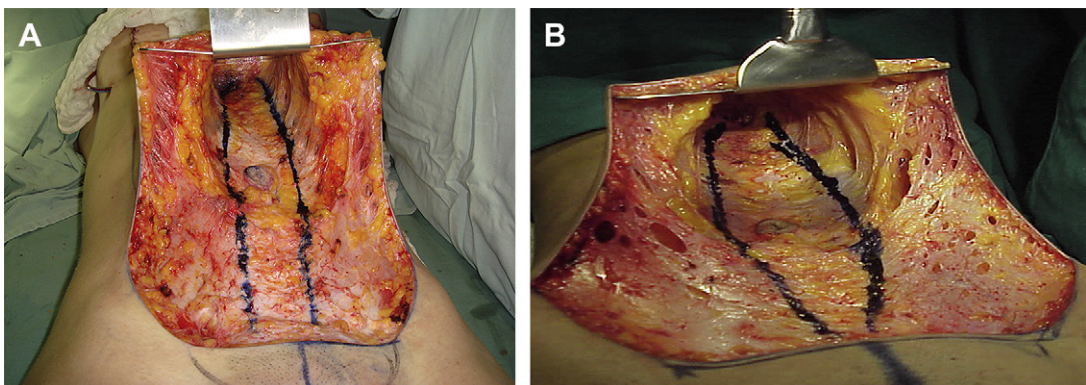


Fig. 13. (A, B) Selective undermining of the tunnel.



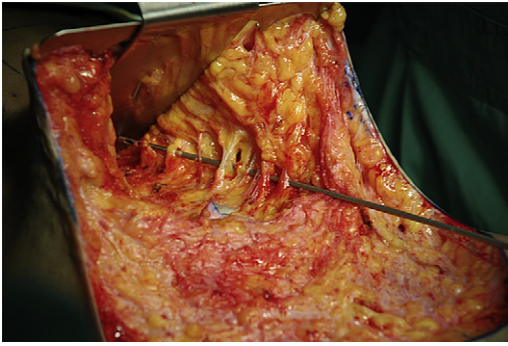


Fig. 14. Perforating vessels.

### ***Scarpa Fascia Preservation***

Preservation of Scarpa fascia is important for many reasons. It causes less bleeding because of the preservation of the inferior perforating vessels. It creates homogeneous support for the upper flap, which becomes thinner in its descent. It causes the contention of scars laterally and offers better adherence between the flap and the deep layers (Fig. 12).

### ***Selective Undermining***

The second principle of lipoabdominoplasty is the preservation of the abdominal perforating vessels and nerves during the procedure. Selective undermining is performed in the midline of the upper abdomen, between the medial edges of the rectus abdominal muscles (Figs. 13 and 14). Neglecting to limit the dissection in this manner may result in damage to perforating vessels, which increases morbidity and the risks of abdominal flap necrosis.

Tunnel undermining may reach the xiphoid, depending on the need for rectus muscle plication. The tunnel width may vary with the distance of diastasis because the perforating vessels follow

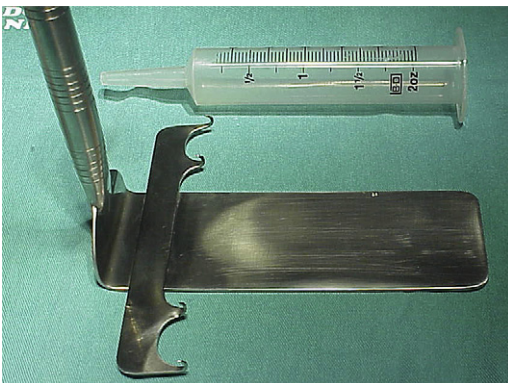


Fig. 15. The Saldanha retractor.

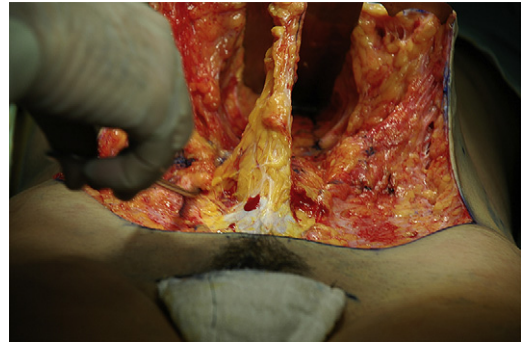


Fig. 16. Resection of the infraumbilical fuse.

the muscle separation. To facilitate the muscle plication and to have a better view of the anatomic structures, the Saldanha's retractor is used. This retractor also improves the visualization of the tunnel created surgically and also prevents the trauma to the edge of the flap (Fig. 15).

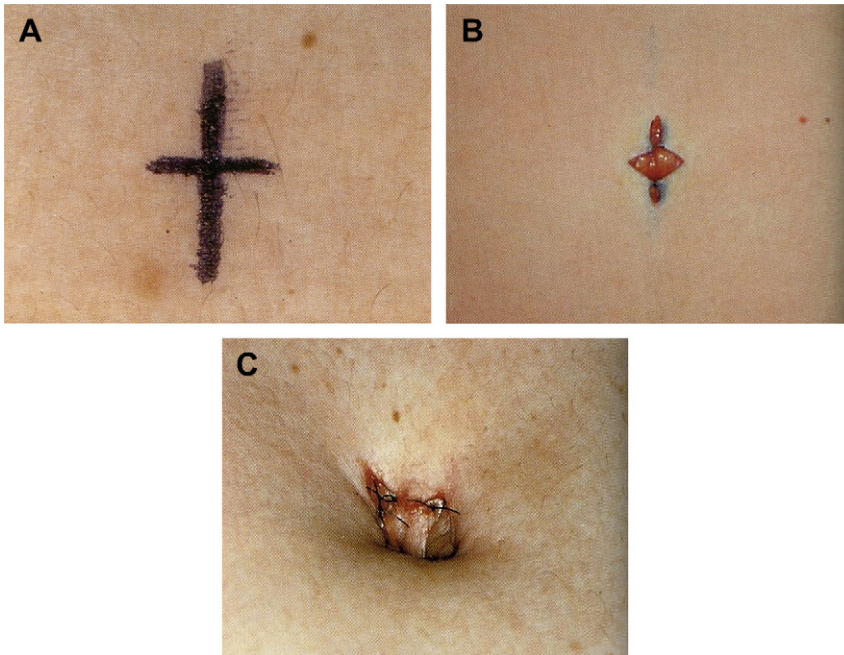
Discontinuous undermining performed using the liposuction cannula facilitates the descent of the flap. De Souza Pinto identified a trabeculae ligament in the upper abdomen, at the base of the xiphoid, which should be released to allow further inferior descent of the abdominal flap to the pubic region. These maneuvers help avoid excessive tension on the suture line.

### ***Removing the Infraumbilical Excess***

Excess skin of the lower abdomen should be removed after the surgeon makes sure that the flap easily transposes to the pubic symphysis. Subsequently, in the midline infraumbilical line, a vertical ellipse of tissue that contains Scarpa fascia and adipose tissue should be removed to expose the medial edges of the rectus muscles and to perform the plication from the xiphoid to the pubis (Figs. 16 and 17).



Fig. 17. Plication.



**Fig. 18.** (A) Marking the star-shaped omphaloplasty technique. (B) Incision for omphaloplasty. (C) Final aspect of umbilicus.



**Fig. 19.** (A) Suture of the layers and lowering of the scar. (B) Removing the fuse to get a lower scar. (C) Scar 6 cm from the vulvar commissure.





Fig. 20. Aspiration drain.

### ***Skin Excess Resection***

#### ***Umblicoplasty/omphaloplasty***

The “star-shaped omphaloplasty technique” is marked on the abdominal wall, and a lozenge shape

is marked on the umbilical pedicle. The cardinal points of the umbilical pedicle are sutured, accommodating themselves on the cruciform incision of the abdominal wall skin. The scar results in continuous Z-plasty that offers little possibility of retraction (Fig. 18).

#### ***Closure of the abdominal wound***

Suturing is done in 2 layers, with 3-0 monocryl for the deep layer and 4-0 monocryl for the subdermis. The skin is sutured with 5-0 mononylon interrupted stitches. At this point, the scar can be lowered by resecting a cutaneous ellipse (1–2 cm) from the pubic skin, without the risk of harming the flap or having too much tension at the suture line (Fig. 19).

A closed suction drain is placed for 1 to 2 days (Fig. 20).

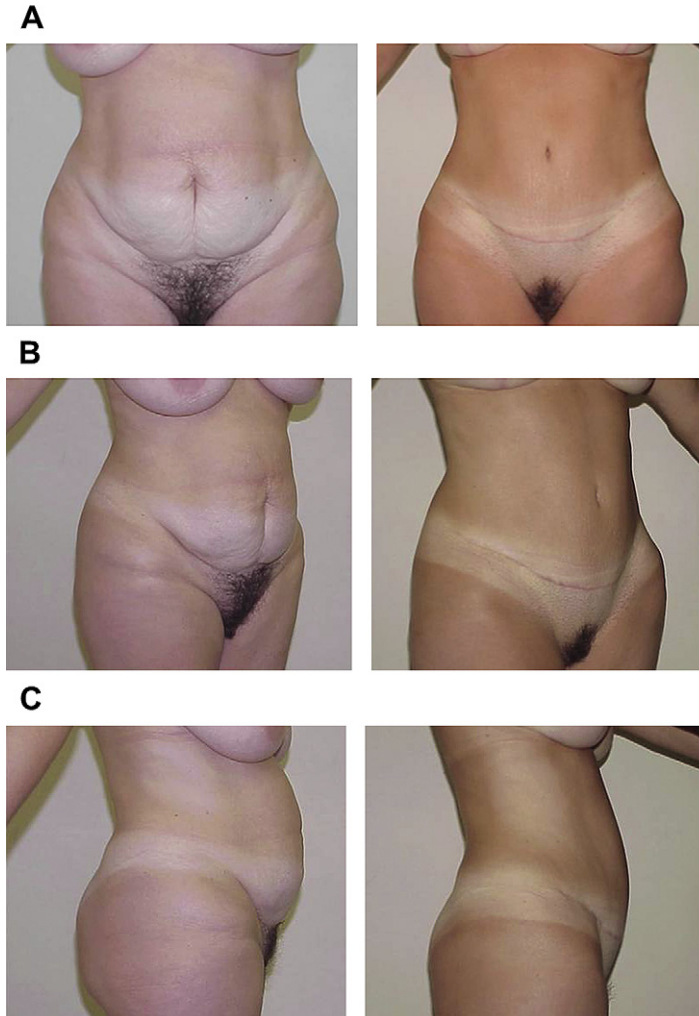


Fig. 21. (A–C) Case 1: pre- and postoperative views of the patient.



### ***Dressing***

The wound is covered with a micropore surgical tape, and a surgical garment is placed on the patient while still on the surgical table.

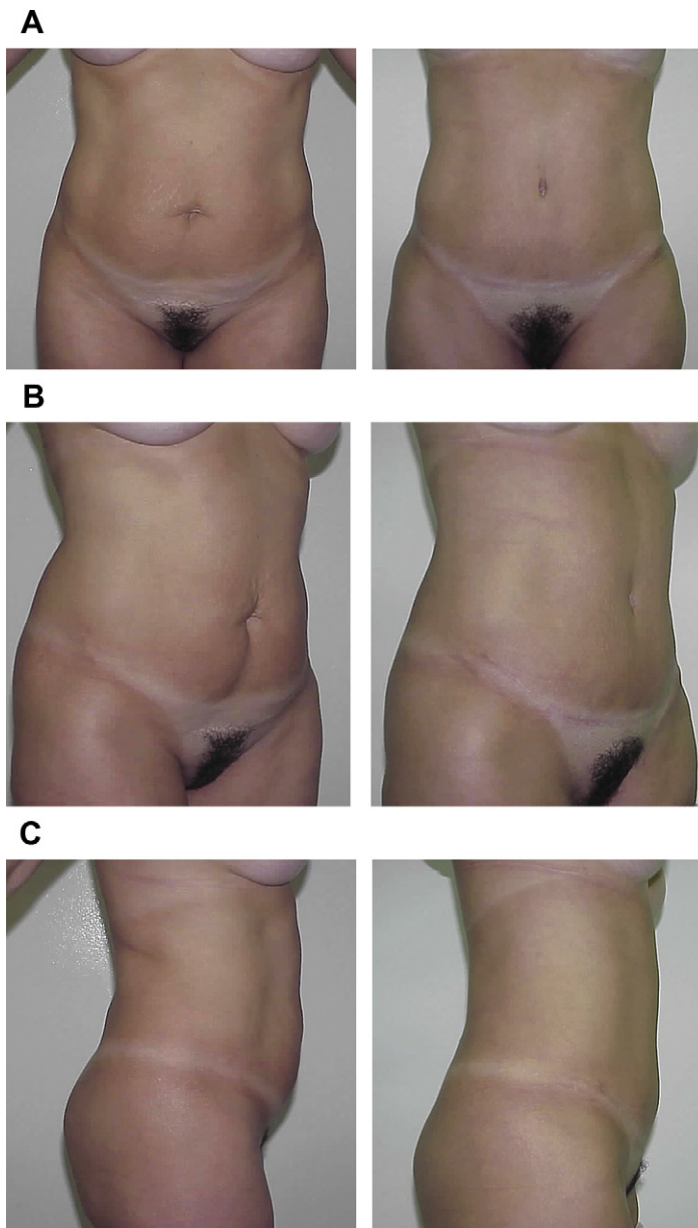
### ***Postoperative Care***

The dressing is changed on the third and eighth days after surgery, when the stitches are removed, except for those on the umbilicus, which are removed on the 12th day after surgery. As previously mentioned, the drain is removed 1 to 2 days after surgery.

Patients who undergo lipoabdominoplasty have an intermediary recovery between abdominoplasty and liposuction because this procedure is less invasive, causes little neurovascular trauma, and leads to less discreet dead space. These factors result in lower morbidity and enable the patient to return early to his or her social and professional activities.

### **RESULTS**

Combining liposuction and abdominoplasty improves the authors' results, is safe, leads to



**Fig. 22.** (A–C) Case 2: pre- and postoperative views of the patient.

a greater reduction in abdominal measurements, and leads to better body contour. There has been less demand for surgical revision since adopting this technique. Patient satisfaction with this technique has led to an increase in requests for lipoabdominoplasty in the authors' practice. In the first 9 years of technique implementation, there was an increase of 100% in the abdominal interventions made by the author (ORS) (before 2000, an average of 35 patients per year, and in 2008, an average of 75 patients per year). The same does not occur to interventions in other parts of the body.

The incidence of complications in traditional abdominoplasty was compared with that of lipoabdominoplasty. From 1979 to 2000 the author performed 494 traditional abdominoplasty surgeries. In 2000 the author began to develop lipoabdominoplasty, and in 2001 it was standardized, which corresponds to 520 procedures from 2000 to 2008. In 2007, only 1 traditional abdominoplasty was performed because it was a specific case of skin excess in a post-bariatric surgery patient. There was a 50% reduction in the need for surgical revisions in the same period.

A decrease in the final scar length was observed when compared with the initial marking in 30% of patients. The initial markings always measured 28 cm in length—12 cm horizontally and 8 cm obliquely on each side. Of the 520 patients who underwent lipoabdominoplasty, 156 had a final scar between 25 and 27 cm, with an average reduction of 2 cm compared with the initial markings. This is probably because of the traction of Scarpa fascia on the skin.

The graceful shape of the umbilicus scar has been evaluated by the team and the patients as good or excellent (Figs. 21–23).

## COMPLICATIONS

When the surgical steps are followed systematically and carefully, lipoabdominoplasty has considerably reduced complications, especially those that are difficult to treat and can jeopardize the doctor-patient relationship. Fig. 24 shows the 9-year statistics of lipoabdominoplasty performance with selective undermining, comparing the percentage of complications with that of traditional abdominoplasty.

Reduced incidence of seroma (from 60% to 0.4%,  $P < .00001$ ), epitheliolysis(?) (from 3.8% to 0.2%,  $P = .00007$ ), dehiscence (from 5.1% to 0.4%,  $P = .00001$ ), and necrosis (from 4% to 0.2%,  $P = .00004$ ) has statistical significance. Although the reduced incidence of hematoma (from 0.6% to 0.2%) and the incidence of

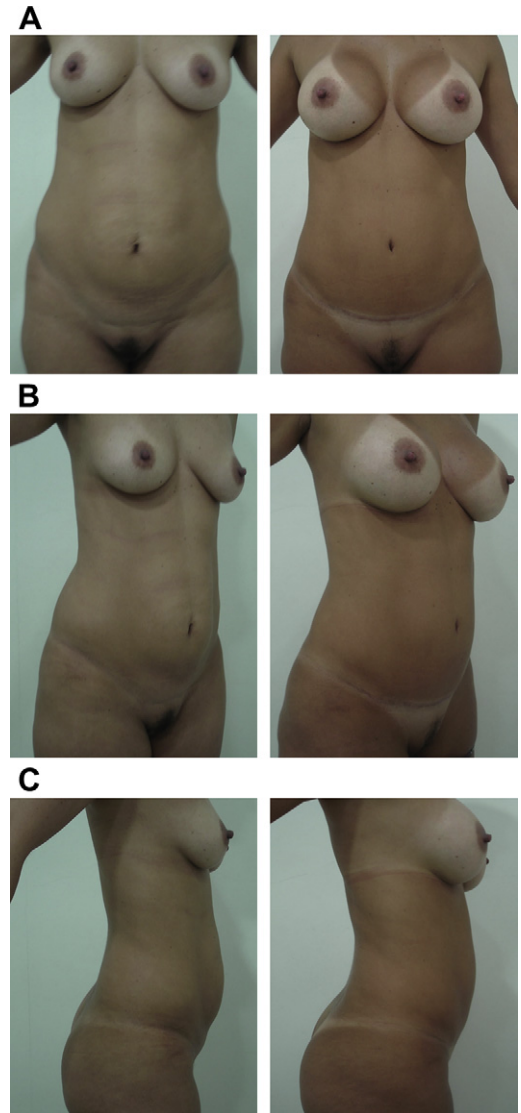
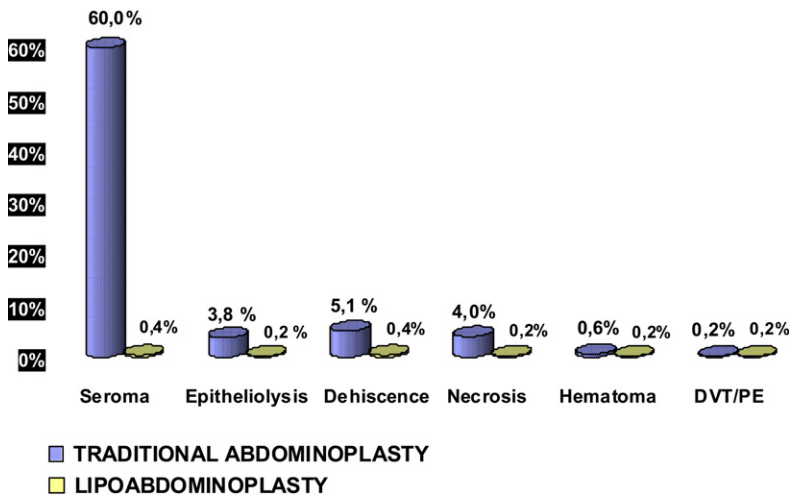


Fig. 23. (A–C) Case 3: pre- and postoperative views of the patient.

deep venous thrombosis/pulmonary embolism remained the same (0.2%), it cannot be considered statistically significant because of the small number of cases. The incidence of surgical revisions decreased from 20% to 10% only when lipoabdominoplasty was adopted, remaining so for 8 years. Table 1 shows the percentage of surgical revisions in lipoabdominoplasty.

The cases of surgical revision because of complementary liposuction and postoperative skin flaccidity (3.2%) corresponded to patients who had previously undergone bariatric surgery and presented a great amount of flaccidity. Surgical revision of scars was needed in 6%, which represents 63% of surgical revisions. Because of this, since 2001 the authors



**Fig. 24.** Complications of lipoabdominoplasty compared with those of traditional abdominoplasty. DVT/PE, deep venous thrombosis/pulmonary embolism.

have been performing only lipoabdominoplasty (Table 2).

## DISCUSSION

Lipoabdominoplasty has been performed with a significant reduction in complications, such as seroma, hematoma, and flap necrosis. This technique avoids 2-stage procedures (abdominoplasty and isolated liposuction) in most patients deemed reasonable candidates for abdominoplasty. Using a conservative approach, liposuction can be safely performed in the abdominal and costal regions to obtain a harmonious body contour, with low morbidity.

Lipoabdominoplasty results in a greater reduction of the abdominal dimensions and a better

body contour not only because of the traditional removal of skin but also because of a decrease in the fat layer located in the abdomen and flanks using liposuction.

The 100% increase in abdominal surgery demand, not encountered in other procedures in the authors' practice, shows patients' acceptance of the technique and how they have recognized the improvement that it has brought. The decrease in the need for surgical revisions is another fact that makes other surgeons motivated to perform this technique.

The use of vacuum closed suction drainage is important to drain the liquid injected to perform liposuction.

In addition, the technique results in preservation of suprapubic sensitivity, quicker healing, faster

**Table 1**  
Surgical revision in lipoabdominoplasty

Total Primary Cases = 520	2000	2001	2002	2003	2004	2005	2006	2007	2008
Scars	3	5	4	3	4	3	3	4	2
Insufficient Liposuction	—	—	1	2	2	1	1	1	1
Excessive Liposuction	—	—	—	—	—	—	—	—	—
Skin Flaccidity	—	—	1	2	1	1	1	2	—
Infection	—	—	—	—	—	—	—	—	—
Other Causes	—	—	—	—	1	—	—	—	—
Total	3	5	6	7	8	5	5	7	3
Percentage	20%	11%	11%	11%	13%	8%	7%	10%	4%



**Table 2**  
**Personal statistic of abdominal surgery**

	1979–1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Abdominoplasty	469	25	—	—	—	—	—	—	1	—	495
Lipoabdominoplasty	—	15	45	55	64	62	65	68	71	75	520

postoperative recovery, lower morbidity, and a better-looking shape of the umbilicus scar. The lipoabdominoplasty also proves to be a special indication for smokers because of the preservation of the perforating abdominal vessels.

### SUMMARY OF ADVANTAGES

- Preservation of the abdominal wall anatomy.
- Decrease in final scar length when compared with the initial markings in 30% of patients.
- A better body contour is achieved because liposuction decreases abdominal dimensions and the thickness of the abdominal flap.
- Morbidity is decreased because of the preservation of the perforating vessels and the absence of a dead space.
- Percentage of complications is low.
- Rejuvenated abdomen with a more natural profile.
- Preservation of the suprapubic sensitivity.
- Rapid postoperative recovery and shorter scar.
- Safe for patients who are smokers or for those who had previously undergone bariatric surgery or reversal abdominoplasty.

### SUMMARY OF DISADVANTAGES

- Initially more than 30 minutes is needed to perform the surgery.
- The procedure should not be performed on patients with a large hernia or eventration.
- A learning curve is required to assimilate the new procedure.

### SUMMARY OF STEPS

1. Marking
2. Infiltration
3. Upper abdomen liposuction
4. Lower abdomen liposuction
5. Scarpa fascia preservation
6. Selective undermining
7. Infraumbilical fuse removal

8. Muscle plication
9. Omphaloplasty
10. Suture of the layers
11. Dressing.

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