

# Lipoabdominoplasty with Progressive Traction Sutures

Javier Vera Cucchiaro, MD  
 Horacio Lostia, MD, SACPER,  
 FILACP  
 Patricia Velazquez, MD, SACPER,  
 FILACP  
 Elizabeth Liska, MD

**Background:** Proactively preserving Scarpa's fascia and thus its intrinsic lymphatic drainage and tensile strength for suture placement can eliminate the need for drains after lipoabdominoplasty and therefore reduce the rate of seroma development. In this article, we describe the effectiveness of a modified progressive traction suture (PTS) technique, which enables us to lessen the most common complications and avoid hospital readmission; these sutures take 3–5 minutes of additional surgery time.

**Methods:** Two hundred seventy-six patients (mean age, 38 years; range, 19–67 years), with a mean body mass index of 25 were included in this study. All patients underwent complete lipoabdominoplasty with ultrasound-assisted liposuction (VASER) throughout the abdomen and flanks. Abdominal rectus plication was performed in 100% of cases. All patients were operated on under spinal anesthesia and stayed overnight in hospital.

**Results:** Of the 276 patients, 1.8% developed postoperative seromas. No patients developed hematomas. New wound closure was needed in 1.4% of patients, performed within 7–10 days of surgery, scar revision in 4.7%, residual liposuction under local anesthesia in 9.7%, and liposuction under sedation in 1%; deep vein thrombosis without thromboembolic phenomenon developed in 1%, none resulting in death. In addition, the use of a PTS technique is a time-saving procedure because it takes the surgeons between 3–5 minutes of operative time, unlike that of adhesion and/or separate traction, which takes between 30 and 45 minutes.

**Conclusions:** The use of PTSs helped diminish complications such as seroma and hematoma and prevent additional cost involving hospital readmission and/or further surgery. Furthermore, use of these sutures required only 3–5 minutes of additional operative time. (*Plast Reconstr Surg Glob Open* 2017;5:e1338; doi: 10.1097/GOX.0000000000001338; Published online 29 June 2017.)

## INTRODUCTION

Lipoabdominoplasty is a hybrid surgical procedure that combines liposuction<sup>1</sup> and abdominoplasty,<sup>2</sup> and lowers the rate of complications.<sup>3,4</sup> This procedure, first reported in 2001 and 2003 by Dr. Osvaldo Saldanha, is gaining popularity within the plastic surgery community.

The aim of this procedure was the preservation of Scarpa's fascia,<sup>5,6</sup> to decrease the risk of seroma formation, preserve lymphatic and vascular structures, and reduce the length of the Pfannenstiel scar.

Liposuction is added to the abdominoplasty procedure to achieve better cosmetic results and maintain limited undermining.<sup>7</sup> When this extensive area is treated with liposuction, the risk of seroma is increased.

*From the Clinic Aesthetic Surgery Salta Argentina, Salta Argentina. Received for publication March 29, 2016; accepted March 10, 2017.*

*Copyright © 2017 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal. DOI: 10.1097/GOX.0000000000001338*

This article highlights the outcomes of this procedure: low incidence of seromas, shorter hospitalization time, given that the patients mobilize more comfortably, and safety<sup>8,9,24,33</sup> without the need for drains.<sup>24,28</sup> Lastly, patient expenses are minimal and there is a low risk of readmission after the surgery.

Abdominoplasty is one of the most commonly performed aesthetic surgical procedures. Seroma is the most common local complication, with incidence rates ranging from 1% to 57% and an average incidence of 10% accepted by most authors.<sup>10,11</sup> Recent publications have advocated the benefits of the lipoabdominoplasty technique, with low rates of seroma of 0–3%.<sup>10,12,13,22,28,29</sup> Seroma frequently causes discomfort and anxiety in patients, which results in the need for more treatment, more visits to the doctor,

**Disclosure:** The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by PRS Global Open at the discretion of the Editor-in-Chief.

Supplemental digital content is available for this article. Clickable URL citations appear in the text.

and increased costs. In some cases, the patient needs to be treated with antibiotics. Close control of the seroma is essential to prevent pseudobursae that will eventually require further surgical intervention. The use of progressive traction sutures (PTSs) is simple and fast, takes minimal time, and eliminates the need for suction drains. They are also used to down the abdominal flap and simultaneously decrease the dead space pocket. Those sutures of adhesion (as described by Baroudi and Ferreira<sup>15,16</sup>) or traction sutures (as described by Pollock and Pollock<sup>17</sup>) avert the use of suction drains, thereby reducing the possibility of seroma. In addition, the patient is more comfortable in the immediate postoperative period, which allows early ambulation and decreases the risk of thromboembolism. The time of hospitalization is shortened and there are fewer complications, such as infection, given that there is no use of postoperative drains. In this article, we describe the effectiveness of a PTS technique to perform this procedure with lower complications rates.

## PATIENTS AND METHODS

We retrospectively evaluated 290 patients, who underwent surgery between January 2011 and December 2014. Exclusion criteria were as follows: patients with a body mass index (BMI) of over 30 kg/m<sup>2</sup>, postbariatric patients, patients who had lost more than 25 kg/m<sup>2</sup> before surgery, and patients who were pregnant (total excluded, 14). A total of 276 patients (272 female and 4 male patients) with a mean age of 38 years (range, 19–67 years) were included for final analysis. The mean BMI was 25 kg/m<sup>2</sup> (range, 19–29.8 kg/m<sup>2</sup>). All patients were treated using PTSs and had a minimum follow-up period of 2 years.

All surgeries were performed by a single surgeon at our surgical facility in Salta, Argentina, Aesthetic and Laser clinic. Our work was performed in a private plastic surgery and followed the principles of the Declaration of Helsinki. All patients provided written informed consent, at least 2 days before their surgery.

### Operative Technique

The surgery was performed using spinal anesthesia with intravenous sedation, administered by anesthesiologists. The procedure started with tumescent infiltration, of the flanks, supra- and infra-umbilical abdominal areas. Ultrasonic energy liposuction (VASER) was performed, and adipose tissue was aspirated. Assisted VASER ultrasonic liposuction was performed in all patients on the flanks, lower back, supra-umbilical abdomen, and pubis. The ultrasound was not used on the infra-umbilical area, but this area was aspirated, allowing pretunneling in the supra- and infra-umbilical areas for dissection.<sup>9,18,19–22</sup> The aspiration was first performed on the flanks, which usually have large areas of lipodystrophy, and then on the anterior abdomen. A cushion or pillow was placed under the patient's back to hyperextend the abdomen and prevent perforation of the abdominal wall or viscera.

We then proceeded to perform resection of the infra-umbilical region, as described by Dr. Pontes Ronaldo,<sup>23</sup> preserving the Scarpa's fascia in the right and left lateral

thirds. In the middle third, the fascia was removed to allow muscle plication.<sup>29</sup> Taking the guidelines published by Dr. Saldanha<sup>19</sup> into account, we performed a selective supra-umbilical undermining, preserving the perforating vessels of the upper abdomen, with previous liposuction of the flap.<sup>26,27</sup> The dissection was carried out using a cold scalpel. The electric scalpel was only used to cauterize the vessels, but not for dissection.

Previously liposuctioned supra-umbilical midline was dissected, in the area of the diastasis of the rectus muscles. The apical portion was released near the xiphoid in a digital way, as described by Dr. Souza Pinto.<sup>1</sup> Then, the entire supra-umbilical area was undermined up to the region of the lateral perforating vessels of the abdominal rectus muscles.<sup>1,9,19,30</sup> This dissection left a thin layer of adipose tissue on the abdominal rectus muscles to prevent seroma formation. After careful hemostasis with a monopolar double clamp, plication of the diastasis of the rectus abdominis was performed with a 2-0 Mononylon X-type suture, as described by Nahas and Ferreira.<sup>24</sup> The cushion or pillow placed previously under the patient's back was removed for the plication. The PTSs were placed with the patient in Fowler's position. In a modification of previously described techniques, 3 Vicryl 2-0 running sutures were placed in Scarpa's fascia, 1 in the supra-umbilical midline and 2 in the infra-umbilical paramedian. These sutures served to pull down the abdominal flap, decreasing scar stress in the supra-pubic and umbilical areas. Suction drains were not used.<sup>15,17,25</sup>

The rectus abdominal muscle was infiltrated with bupivacaine as described by Dr. Aldo Mottura.<sup>30</sup>

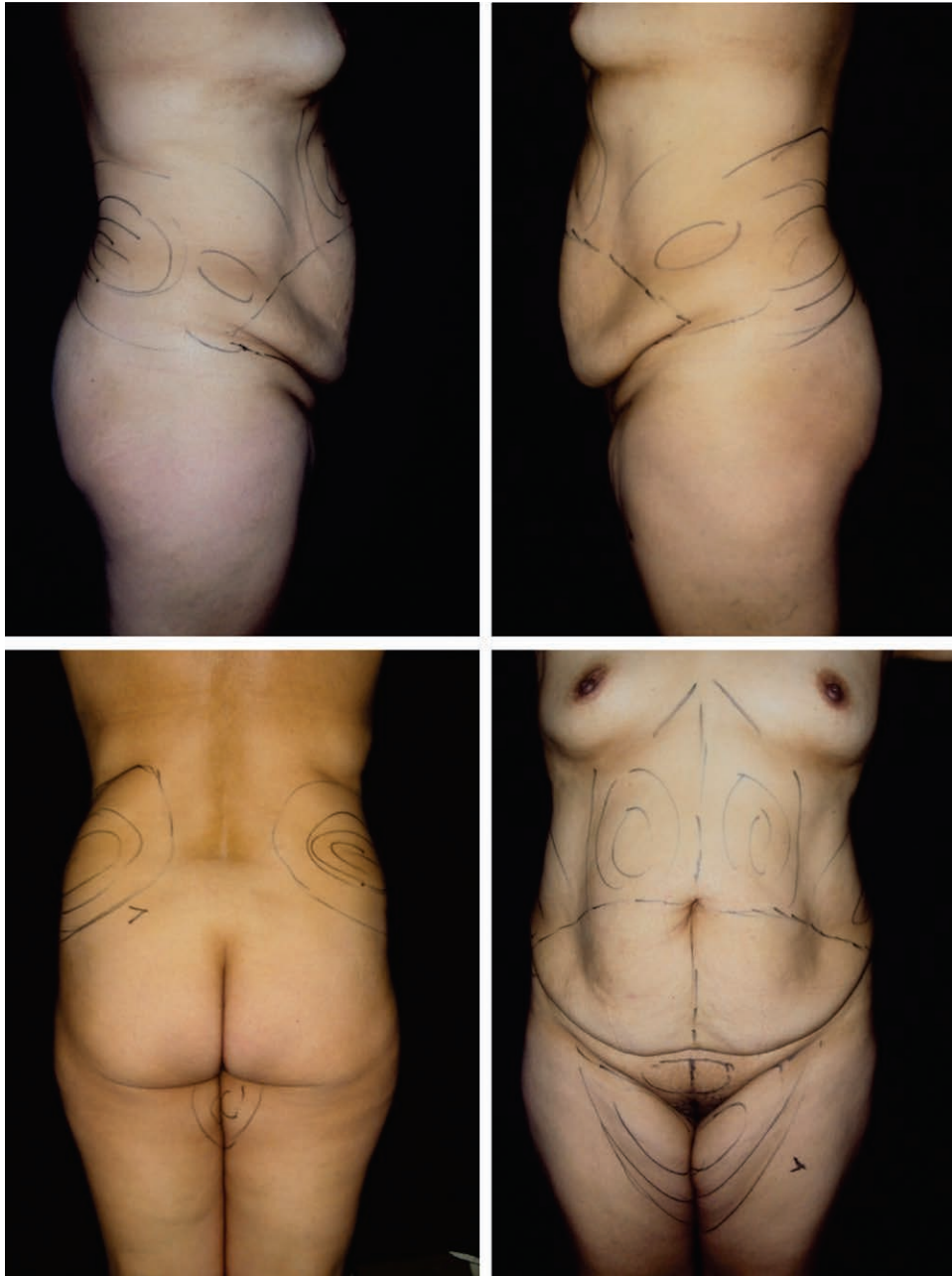
An intramuscular fat graft of the buttocks or liposuction in the neighboring areas was conducted in 70% of cases. Deep vein thrombosis (DVT) prophylaxis consisted of 40 mg of low molecular weight heparin in 80% of cases, administered 2 hours after the start of surgery. Sequential venous pump pressure therapy was used intraoperatively and up to 2 hours postoperatively in all cases.

Patients were hospitalized until the following day (Figs. 1, 2).

## RESULTS

The mean BMI of all patients was 25.17. Forty-seven patients (17.0%) had undergone previous abdominoplasty or abdomen liposuction, 19 patients (6.8%) had umbilical hernias, and 3 patients (1%) had supra-umbilical hernias (Figs. 3, 4). An ultrasound of the abdominal wall is usually performed as part of the presurgical routine. All cases underwent full lipoabdominoplasty, given that mini-lipoabdominoplasty and reverse lipoabdominoplasty are seldom performed.<sup>9,14,16,18</sup> New sutures were needed within 7–10 days in 1.4% of the patients (4 cases) because of minor wound dehiscence. Scar revision was needed in 4.7% (13 cases), residual liposuction under local anesthesia was needed in 9.7% (27 cases), liposuction under sedation was needed in 1% (3 cases), seromas were present in 1.8% (5 cases), and DVT was present in 1% (3 cases). There were no cases of pulmonary embolism (PE), death, or hematoma.

Ultrasound of the abdominal wall to check fluid collection was performed in all patients postoperatively in



**Fig. 1.** A 51-year-old patient preoperatively who underwent combined lipoabdominoplasty and liposuction of flanks, inner thigh, and pubis.

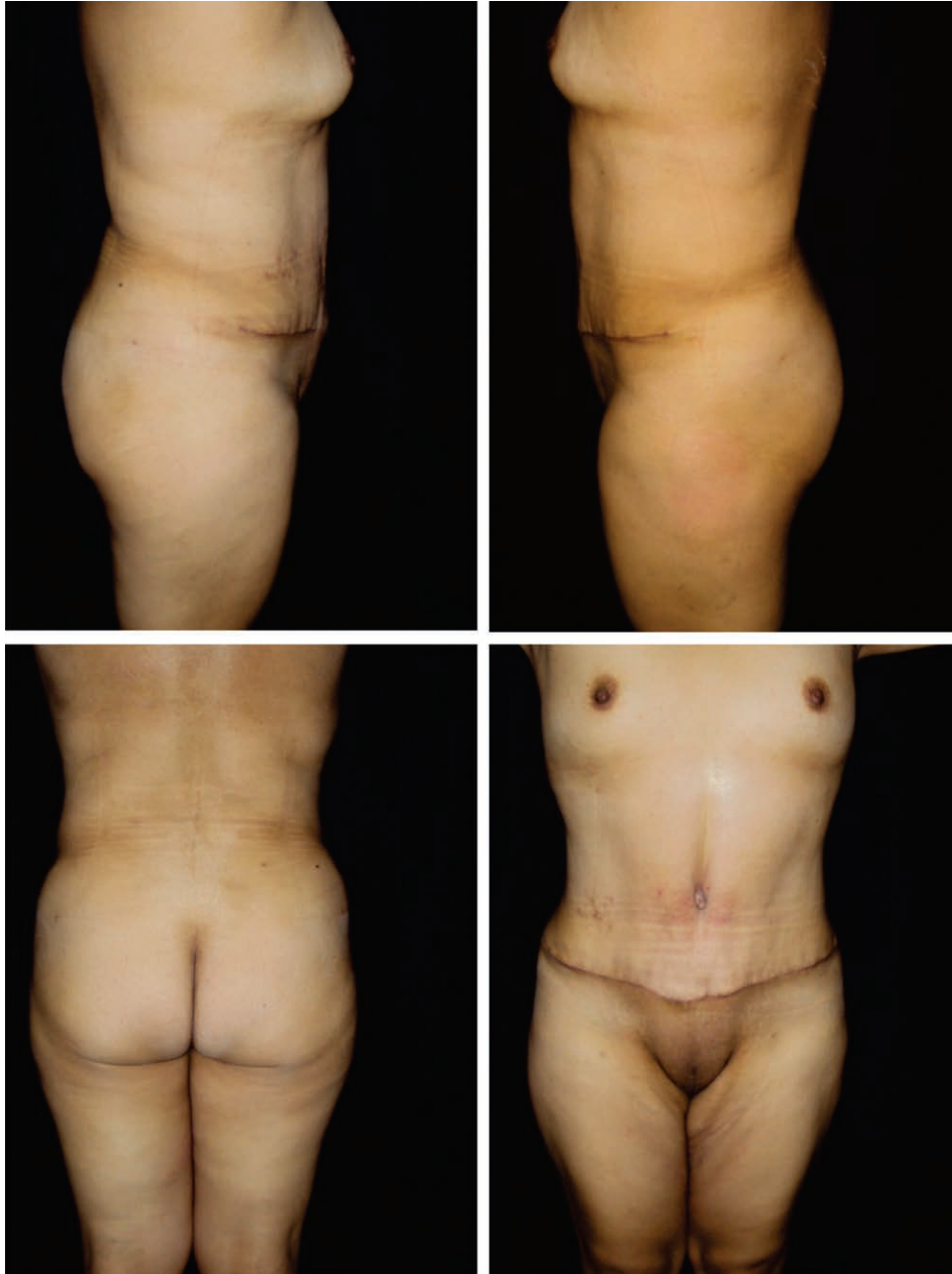
the second and third weeks after surgery. Ultrasonography was carried out to measure the fluid volume in millimeters, with a volume of more than 20 mL considered positive for seroma. All fluids collected were aspirated and then examined. Doppler examination was used to evaluate flow speed and vessel perimeter and diagnosed DVT. Our study did not have an independent observer, as all personnel were part of our medical staff.

### DISCUSSION

Seromas, hematomas, and wound dehiscence can result in time-consuming complications, risking patient

satisfaction and cosmetic outcomes. Seroma typically presents 2–3 weeks postoperatively due to damage of the lymphatic vessel associated with tissue undermining and flap elevation. Treatment of the collection of lymphatic fluid can involve many aspirations to prevent the development of pseudocysts and pseudobursae.<sup>34</sup>

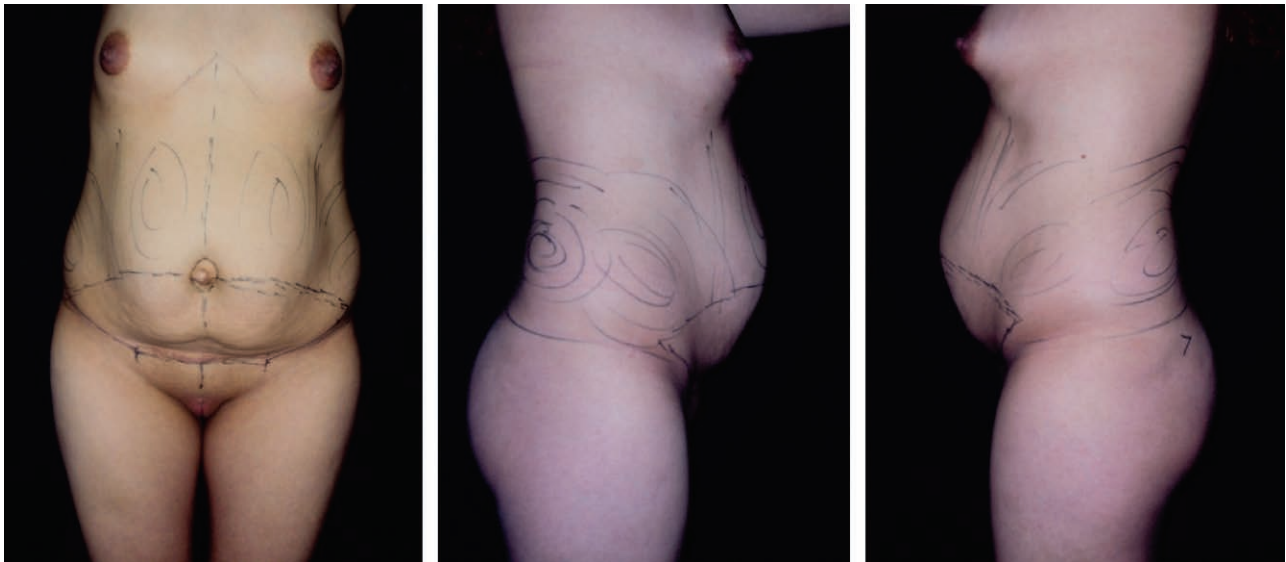
When these conditions develop, the capsule will eventually contract, leading to a deformity of the anterior region of the abdomen.<sup>8,19,34</sup> Another possible complication is infection of the fluid collection. Some of the techniques that have been developed to decrease the rate of seroma formation include tension sutures and quilting sutures.



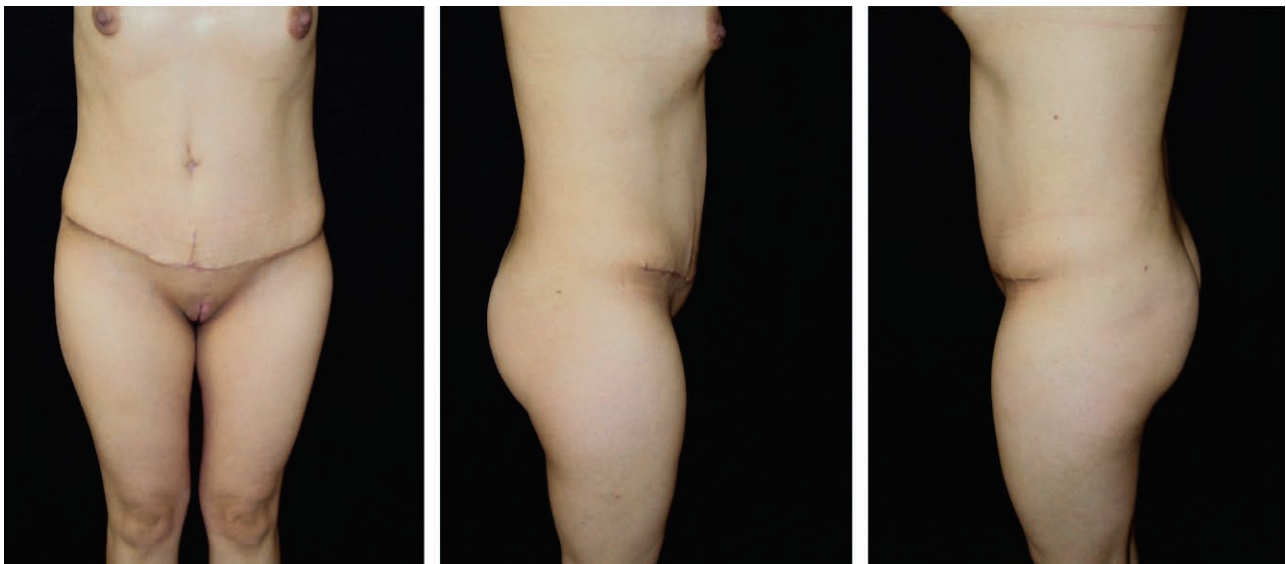
**Fig. 2.** Three months postoperative with body contouring.

The placement of postoperative drains may lead to infection and discomfort in patients.<sup>8,19,20</sup> There have been no cases of hematomas caused by limited space allowed by sutures for the formation of large collection areas of blood.<sup>25</sup> Another possibility is infection of the hematoma or another fluid collection. Liposuction has been added to the abdominoplasty procedure to achieve better results and maintain limited undermining.<sup>7</sup> Our routine used tumescent infiltration and application of (VASER). Liposuction increases risk of seroma development. Baroudi and Ferreira<sup>15</sup> and Pollock and Pollock<sup>17</sup> describe the use of a large number of traction sutures (30–40 stitches) to (1) obliterate dead spaces, (2) minimize movement and friction of

the flap, (3) decrease the occurrence rate of seromas, and (4) reduce the use of drains. The PTSs have other indirect advantages such as reducing scar traction, decreasing the dead space pocket, spreading the traction on the flap to allow better scar healing, avoiding the upper stretch of the scar, and preventing flap necrosis. Furthermore, PTSs reduce stress on the umbilicus, preserve its vascularization and reduce umbilical complications. The main disadvantage compared with adhesion and/or tension sutures is that PTSs take between 30 and 45 minutes (average of 30 minutes) to place. The technique described herein uses 3 continuous absorbable sutures (Vicryl sutures 2-0), 1 suture in the supra-umbilical midline and the other 2 in



**Fig. 3.** A 40-year-old patient preoperatively who underwent combined lipoabdominoplasty and suction of flanks and correction of umbilical hernia.



**Fig. 4.** Three months postoperatively of lipoabdominoplasty with liposuction. Satisfactory results as seen in lateral views.

the infra-umbilical paramedians, requiring only an additional 3–5 minutes. PTSs may prevent the sharing effect that disrupts the early phase of the healing process between the aponeurotic and the abdominal flap. (See video, **Supplemental Digital Content 1**, which shows lipoabdominoplasty and how the procedure can be performed in 3–5 minutes. This video is available in the “Related Videos” section of the Full-Text article on PRSGlobalOpen.com or available at <http://links.lww.com/PRSGO/A440>.)

Ninety-eight percentage of surgeons report using drains for prevention of seromas, with drains removed an average of 8 days later.<sup>33</sup> Suction drains have been used to treat and prevent development of seromas and hematomas. Seroma formation occurs during the first 2–3 weeks after surgery. The presence of drains complicates early ambulation, pro-

longs hospital stays, and increases the risk of acquired infections with antibiotic resistant organisms.<sup>25,35</sup> Drains can be a source of retrograde infection and are a significant irritation for the patient.<sup>25,29,35</sup> By avoiding the use of suction drains, the patient is able to walk 2 hours after surgery with greater comfort. It also allows the use of a moderate compression shaper girdle, which does not increase the intra-abdominal pressure<sup>29</sup> and results in lower risk of DVT or PE. When intense compression of the sharper girdle was used, there was an increase in the perimeter area, and diameter of the femoral vein, which increases significantly in Fowler’s position. The use of these types of intense compressive garments and Fowler’s position may increase the risk of DVT and PE.

It is important to consider that if the patient has previously undergone liposuction in the abdominal area, the abdominal



**Video Graphic 1.** See video, Supplemental Digital Content 1, which shows lipoabdominoplasty and how the procedure can be performed in 3–5 minutes. This video is available in the “Related Videos” section of the Full-Text article on PRSGlobalOpen.com or available at <http://links.lww.com/PRSGO/A440>.

flap has lower elasticity of traction. In such cases, we resect a lesser amount of tissue. The use of PTSs allowed a very low incidence of seroma in our study (1.8%), and no patients developed hematoma. In all cases, hospitalization was 1 night, with early ambulation, usually 2 hours after the surgery, and low molecular weight heparin used in 80% of patients. Seromas were small and resolved with 2 or 3 weekly punctures. All diagnoses were made using ultrasound.<sup>29</sup> Patients can mobilize themselves better and without fear with no suction drains, indirectly preventing DVT and PE. No patient had to be readmitted to hospital. Minor complications were resolved on an outpatient basis under local anesthesia, which did not increase costs or major complications for new admissions. Therefore, ultrasound liposuction (VASER) could be performed without difficulty and with excellent cosmetic results. Our study was limited by the small number of patients, and we did not have a control group. Our experience was limited to a private clinic.

## CONCLUSIONS

Our modified technique showed a lesser frequency of complications such as hematoma and seromas.

The use of PTS helped prevent minor complications and adverse events such as the development of pseudobursae, which would need further surgical intervention. Use of PTSs required only an additional 3–5 minutes of operative time and helped avoid patient readmission, thus reducing costs for patients.

**Javier Vera Cucchiario, MD**

Clinic Aesthetic Surgery Salta Argentina  
Av Entre Rios 220  
Salta, 4400  
Argentina

E-mail: [jvc@centrocirugiaestetica.com](mailto:jvc@centrocirugiaestetica.com)

## REFERENCES

- De Souza Pinto EB. Our experience in liposuction. *Ann Cong Bras Plast Surg*. 1983;1:9.
- Matarasso A. Abdominoplasty: a system of classification and treatment for combined abdominoplasty and suction-assisted lipectomy. *Aesthetic Plast Surg*. 1991;15:111–121.
- Matarasso A. Liposuction as an adjunct to a full abdominoplasty. *Plast Reconstr Surg*. 1995;95:829–836.
- Illouz YG. A new safe and aesthetic approach to suction abdominoplasty. *Aesthetic Plast Surg*. 1992;16:237–245.
- Lockwood T. High-lateral-tension abdominoplasty with superficial fascial system suspension. *Plast Reconstr Surg*. 1995;96:603–615.
- Lockwood T. The role of excisional lifting in body contour surgery. *Clin Plast Surg*. 1996;23:695–712.
- Trussler Ap, Kurkjian TJ, Hatfield DA, et al. Refinements in abdominoplasty: a critical outcomes analysis over 20 year period. *Plast Reconstr Surg*. 2010;126:1063–1074.
- Friedland JA, Maffi TR. MOC-PS(SM) CME article: abdominoplasty. *Plast Reconstr Surg*. 2008;121:1–11.
- Saldanha OR, Pinto EB, Matos WN, Jr, et al. Lipoabdominoplasty without undermining. *Aesthetic Surg J*. 2001;21:518–526.
- van Uchelen JH, Werker PM, Kon M. Complications of abdominoplasty in 86 patients. *Plast Reconstr Surg*. 2001;107:1869–1873.
- Stocchero IN. Ultrasound and seromas. *Plast Reconstr Surg*. 1993;91:198.
- Andrades P, Prado A. Composition of postabdominoplasty seroma. *Aesthetic Plast Surg*. 2007;31:514–518.
- Zimman OA, Butto CD, Ahuali PE. Frequency of seroma in abdominal lipectomies. *Plast Reconstr Surg*. 2001;25:365–371.
- Shestak KC. Marriage abdominoplasty expands the mini-abdominoplasty concept. *Plast Reconstr Surg*. 1999;103:1020–1031; discussion 1032.
- Baroudi R, Ferreira CA. Seroma: how to avoid it and how to treat it. *Aesthet Surg J*. 1998;18:439–441.
- Avelar JM. Abdominoplasty: a new technique without undermining and fat layer removal. *Arq Catarinense Med*. 2000;291:147–149.
- Pollock H, Pollock T. Progressive tension sutures: a technique to reduce local complications in abdominoplasty. *Plast Reconstr Surg*. 2000;105:2583–2586; discussion 2587.
- Cardoso de Castro C, Salema R, Atlas P, et al. Abdominoplasty to remove multiple scars from the abdomen. *Ann Plast Surg*. 1984;12:369–373.
- Saldanha OR, De Souza Pinto EB, Mattos WN, Jr, et al. Lipoabdominoplasty with selective and safe undermining. *Aesthetic Plast Surg*. 2003;27:322–327.
- Saldanha OR. *Lipoabdominoplastia*. Rio de Janeiro, Brazil: Di-Livros; 2004.
- Saldanha OR. *Lipoabdominoplasty*. Rio de Janeiro, Brazil: Di-Livros; 2006.
- Saldanha OR. *Lipoabdominoplastia*. Caracas, Venezuela: Amolca; 2007.
- Pontes R. *Abdominoplastia: Resección en bloque y su aplicación en el lifting de cadera y en la torsoplastia*. Caracas, Venezuela: Amolca; 2005:25–54.
- Nahas FX, Ferreira LM. Concepts on correction of the musculoponeurotic layer in abdominoplasty. *Clin Plast Surg*. 2010;37:527–538.
- Nahas FX, Ferreira LM, Ghelfond C. Does quilting suture prevent seroma in abdominoplasty? *Plast Reconstr Surg*. 2007;119:1060–1064; discussion 1065.
- Munhoz AM, Ishida LH, Sturtz GP, et al. Importance of lateral row perforator vessels in deep inferior epigastric perforator flap harvesting. *Plast Reconstr Surg*. 2004;113:517–524.
- Graf R. Lipoabdominoplasty: fluxmetry study and technical variation. In: *Lipoabdominoplasty*. Rio de Janeiro, Brazil: Di-Livros; 2006.
- Costa Ferreira A, Rebelo M, Vasconez LO, et al. Scarpa fascia preservation during abdominoplasty: a prospective study. *Plast Reconstr Surg*. 2010;126:1742–1751.
- Berjeaut RH, Nahas FX, Dos Santos LK, et al. Does the use of compression garments increase venous stasis in the common femoral vein? *Plast Reconstr Surg*. 2015;135:85e–91e.

30. Mottura AA. Local anesthesia for abdominoplasty, liposuction, and combined operations. *Plast Reconstr Surg*. 1994;94:227–228.
31. Araco A, Gravante G, Sorge R, et al. Postoperative seromas after abdominoplasty: a prospective, randomized, double blind clinical trial. *Plast Reconstr Surg*. 2009;123:158e–159e.
32. Mohammad JA, Warnke PH, Stavraky W. Ultrasound in the diagnosis and management of fluid collection complications following abdominoplasty. *Ann Plast Surg*. 1998;41:498–502.
33. Matarasso A, Swift RW, Rankin M. Abdominoplasty and abdominal contour surgery: a national plastic surgery survey. *Plast Reconstr Surg*. 2006;117:1797–1808.
34. Zecha PJ, Missoten FE. Pseudocyst formation after abdominoplasty: extravasation of Morel-Lavallée. *Br J Plast Surg*. 1995;52:500–502.
35. Khan UD. Risk of seroma with simultaneous liposuction and abdominoplasty and the role of progressive tension sutures. *Aesthetic Plast Surg*. 2008;32:93–99; discussion 100.