TULUA Male High-Definition Abdominoplasty

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Background: Abdominoplasty is a surgical technique for body contouring that has been shown to improve the patient's quality of life. It has become more common among male patients, so clear differences between procedures for men and women have to be stated. The authors present their experience with high-definition lipoabdominoplasty with transverse plication in men.

Methods: Records of male patients undergoing transverse plication full abdominoplasty in addition to high-definition liposculpture were analyzed. A total of 24 consecutive cases were found between January of 2017 and June of 2019. Patient ages ranged from 24 to 60 years. Patients aged 18 years or younger were excluded. Body mass index ranged from 25 to 33 kg/m^2. Photographic records were taken before and during follow-up at 2 days and 1, 3, 6, and 12 months after surgery.

Results: Male TULUA (transverse plication, no undermining, full liposuction, neoumbilicoplasty, and low transverse abdominal scar) with high-definition lipoabdominoplasty was successfully achieved in 24 cases. No major complications were reported. Six minor complications were reported (25 percent). Rectus abdominis diastases are less common in men compared to women, as pregnancy is the most determining factor in its development. Fat distribution is also a key difference when performing lipoabdominoplasty for the male or the female patient. The authors recommend a transverse plication of the abdominal wall, instead of a vertical one, as flap viability is preserved and enhanced muscular definition can be accomplished.

Conclusions: Combining transverse plication with high-definition lipoabdominoplasty (transverse plication, no undermining, full liposuction, neoumbilicoplasty, and low transverse abdominal scar plus high-definition lipoabdominoplasty) is a safe and reproducible technique for the male patient. It offers higher aesthetic results in line with modern beauty ideals. (*Plast. Reconstr. Surg.* 149: 96, 2022.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

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THERAPEUTIC

Removing fat and skin excess in addition to abdominal muscle diastasis correction are the key components of lipoabdominoplasty, which has widely been reported to improve the patient's quality of life.[1–3] Over time, abdominoplasty techniques have constantly been improved since Demars and Marx reported the first dermolipectomy in 1880.[4] Also, Kelly performed a "transverse abdominal lipectomy" in 1899 in the United States.[3,5] Later, new techniques and combined procedures were reported,[3,6] such as the liposuction-assisted abdominoplasty described in 1992 by Illouz,[7] and the lipoabdominoplasty techniques by Avelar[8] and Saldanha et al.,[9] which have dramatically enhanced outcomes of the procedure.[10]

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Abdominoplasty is a cosmetic procedure focused on removing excessive soft tissue (skin, fat, and sometimes muscle) in the abdominal region with minor scars.[10] This procedure was classified by Matarasso et al. according to the patient's clinical features as follows: liposuction alone (type I), miniabdominoplasty (type II), modified abdominoplasty (type III), and lipoabdominoplasty (type IV).[10,11]

This procedure has been gaining more followers in recent years. Liposuction and abdominoplasty (tummy tuck) were among the top five cosmetics operations for men in 2018 in the United States according to the Cosmetic Surgery National Data Bank.[12] The most common indications for abdominoplasty in women are postpartum abdominal changes, which include skin excess and damage, changes in distribution of adipose deposits, and rectus muscle stretching and diastases.[11] The latter is the mainstay from vertical plication used in conventional female abdominoplasty, which almost always occurs by progressive intraabdominal pressure increase during pregnancy.[11,13] By contrast, the main reasons for men seeking surgery were lipodystrophy, abdominal bulges, and flaccidity and redundant skin after metabolic operations or major weight loss.[14] Diastasis is uncommon in men; thus, we started to perform a transverse plication for the male abdominoplasty. This correction vector may optimize the flap neovascularization and reduce the risk of skin necrosis. We present our experience on TULUA (transverse plication, no undermining, full liposuction, neoumbilicoplasty, and low transverse abdominal scar), a technique named after the native city of the creator, Dr. Francisco Villegas,[15] in combination with high-definition liposculpture (TULUA HD) for abdominoplasty in men with the aim of decreasing the risk of complications and achieving better aesthetic outcomes.[15,16]

MATERIALS AND METHODS

We retrospectively reviewed the databases of clinical histories from the Dhara Clinic (Bogota, Colombia) and the Bazterrica Clinic (Buenos Aires, Argentina) as informative support for the location of male patients who underwent high-definition liposculpture plus abdominoplasty with transverse plication. We found that 24 consecutive operations were performed between January of 2017 and June of 2019 ($n = 13$ in Bogota and $n = 11$ in Argentina). Inclusion criteria were as follows: male patients who underwent high-definition liposculpture and abdominoplasty and were subject to transverse plication during the abdominoplasty. Exclusion criteria were male patients for whom high-definition liposculpture plus conventional abdominoplasty (vertical plication) was performed. Diabetic patients or those with uncontrolled hypertension, heavy smokers, and patients with liver dysfunction and/or peripheral vascular disease were also excluded. Patient data are presented in Table 1. Cardiology assessment including electrocardiography and chest radiography was required for patients older than 40 years. Photographic records were taken before and during follow-up at 2 days and 1, 3, 6, and 12 months after surgery.

SURGICAL TECHNIQUE

Preoperative Markings

Marks are drawn on the patient in the upright standing position. Reference points are the deltoids, pectoralis major, rectus abdominis, external oblique, serratus anterior, iliac crest, and inguinal ligaments in addition to the lateral and posterior torso anatomy, latissimus dorsi, gluteus maximus, sacral concavity, and the perigluteal area[6,15,17] (Fig. 1).

Under general anesthesia, superficial silk tags are stitched on the suprasternal notch and measured to each one of the horizontal intersections of the rectus abdominis muscle (according to the individual's anatomy) and the ideal umbilicus zone. The distal ends are referenced by baby mosquito forceps, which are going to be used later (after liposculpture and flap downward displacement) for the muscular carving and definition. In the male, the third tendinous intersection usually matches with the umbilicus position over the midline (Fig. 2).

Liposculpture

Hidden incisions (approximately 5 mm) are made according to zone for definition: (1) abdomen and torso (one on the navel, two below the pubis hairline, and two on the inferior border of nipples[18]); (2) arms (bilateral incisions are placed in the posterior axillary crease and anterior

Table 1. Patient Demographics

	Value
Age, yr	
Average	33.5
Range	24–64
Body mass index, kg/m^2	
Mean	29.5
Range	27–34
Surgical time, hr	
Mode	4
Range	3.5–5

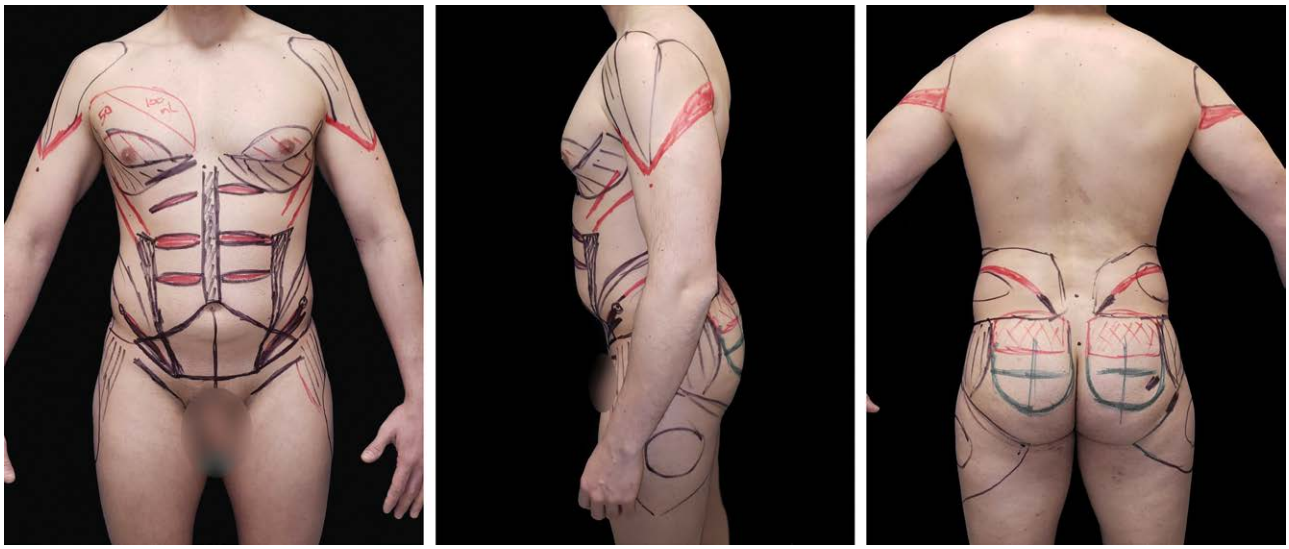

Fig. 1. Preoperative markings. Areas for deep and superficial liposuction and areas for smooth definition [negative spaces (Hoyos AE, Prendergast PM, eds. Male abdomen and torso. In: *High Definition Body Sculpting*. Berlin: Springer; 2014:95–107)] are marked in the anterior (*left*) and posterior (*right*) torso. Abdominal carving is focused in the flanks and the "six-pack," whereas arms and pectorals (*center*) can also be defined in high-definition liposculpture for the male patient. Also, the gluteal region (*right*) is marked for definition and fat grafting (if required).

axillary fold, and one incision is place at the elbow near the olecranon tip[19]); and (3) back, buttocks, and thighs (incisions are used, one in the intergluteal crease and two in the infragluteal creases[20,21]). Silicone ports are fixed in these locations with 4-0 silk sutures.

Traditional tumescent infiltration of 1000 ml of normal saline plus 10 ml of 1% lidocaine and 1 ml of epinephrine 1:1000 is performed over the superficial and deep fat layers. Fat emulsification is achieved using third-generation ultrasound (VASER Lipo; Solta Medical–Bausch Health Companies, Inc., Bothell, Wash.) with 3-mm and 3.7-mm grooved probes in 70 to 80 percent pulsed mode. MicroAire-assisted liposuction (MicroAire Surgical Instruments, LLC, Charlottesville, Va.) was performed in the deep layer for all body segments and in the superficial layer for the additional body segments to be defined according to each patient's desires and scheduled procedures (including superficial carving and muscular definition), guided by preoperative marks and using 4.6-and 3.7-mm cannulas. Thorough abdominal deep liposuction was achieved over the lateral posterior flanks to get rid of the "love handles" and until reaching the desired anterior flap thickness,[6] whereas the superficial treatment was left for subsequent abdominal muscular definition, which was performed after abdominoplasty.[18,20]

Fig. 2. Umbilicus tags. Careful measurements are taken from the sternal notch to the lower edge of first, second, and third rectus abdominis tendinous intersections. We use silk referenced with baby mosquito forceps for this purpose.

Transverse Plication

After liposuction, a transverse incision is made over the suprapubic region, and the hypogastric flap is raised toward and until the umbilicus. Hemostasis is cautiously performed. Flap dissection should include but does not surpass the umbilicus level to ensure the resultant scar is located lower than with original lipoabdominoplasty techniques (vertical plication and xiphoid dissection). Then, a horizontal ellipse is drawn over the exposed fascia from one iliac spine to the other, passing across the umbilicus and pubis

Fig. 3. Transverse plication. The ellipse shape is made for plication guidance.

(Fig. 3). Transverse plication is made by facing the borders of the drawn ellipse with interrupted 0 polypropylene stitches and then a running suture for reinforcement.[15,17] [**See Video (online)**, which demonstrates the transverse muscular plication during TULUA HD technique with interrupted figure-of-eight suture.]

Abdominoplasty

The navel is amputated after its descent because of transverse plication and the residual opening is repaired with 0 polypropylene stitches. The formerly elevated hypogastric flap is then resected. The wound is closed in layers with 2-0 polyglactin stitches at the subcutaneous planes, superficial aponeurosis, and dermis. Once the abdominal flap has been advanced, smooth superficial liposuction can be done over the flap to obtain an adequate and natural definition of the rectus abdominis muscles. Then, the skin is sutured with 3-0 polypropylene intradermal continuous suture. Blake drains (Ethicon, Inc., Johnson & Johnson, Warsaw, Ind.) are left in the subcutaneous space for approximately 7 days postoperatively.[15,17]

Neoumbilicoplasty

After skin flap closure, the new umbilicus must be located and built. Although several specific anatomical points have been proposed,[22,23] the authors have described a zone rather than a specific point. This "ideal umbilicus zone" is defined as the area delimited between the junction of the two upper thirds and the third quarter over a line between the xiphoid process and the pubis (Fig. 4). Silk references are used to ensure the new navel position will remain inside the ideal umbilical zone (Figs. 5 and 6), as they precisely

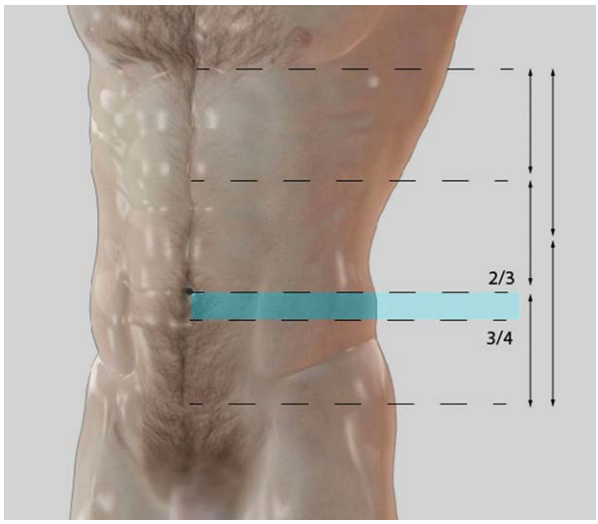

Fig. 4. Ideal umbilical zone in men. Area over a line traced from the xiphoid process to the pubis, between the intersection of the two upper thirds and the third quarter.

represent where the rectus abdominis muscle tendinous intersections are located (see Preoperative Markings section). As described in a previous article,[24] an X-shaped incision is made across the line alba deep enough to reach the rectus abdominis fascia and with 60-degree superior and inferior opposite angles. Upper incisions must be 10 mm long and lower incisions 5 mm long. In consequence, four triangular flaps are made: superior, inferior, left, and right. The three lower flaps are sutured with a continuous subcuticular stitch and fixed upward to the abdominal fascia at the base of the upper flap. We use a gauze covered with antibiotic (as a shaper) to induce deep flap adhesion and depth.

Fig. 5. Silk tags are used to carve the rectus abdominis muscle tendinous intersections and ensure the new location of the umbilicus.

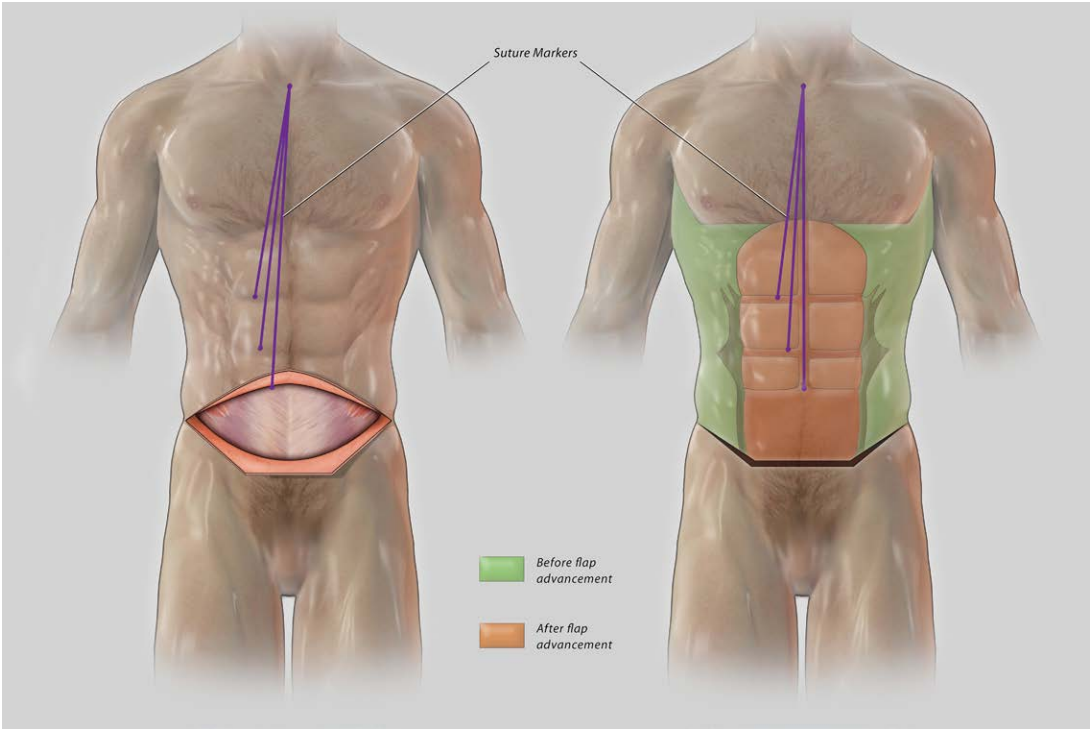

Fig. 6. The ellipse is the guidance for the transverse plication; observe how the longest silk delimitates with the upper border of the ellipse (*left*). Once the transverse plication is made, the measure of the longest silk will ensure that the neoumbilicus remains in the ideal umbilical zone. (*Right*) The superficial liposuction (*green zone*) is performed before the flap is advanced and (*orange zone*) after the flap is advanced to define the tendinous intersections of the rectus abdominis.

All patients received chemoprophylaxis for deep venous thrombosis with enoxaparin (0.5 mg/kg per day for 7 days after surgery; for 14 days in patients with Caprini score 2 or greater). In addition, all patients wore high-compression stockings for the first 3 postoperative days, and intermittent compression stockings were used during surgery.

RESULTS

TULUA HD was successfully performed in 24 male patients (Figs. 7 through 10). Average fat tissue extraction volume was 4000 ml (range, 2800 to 6000 cc). Fat grafting was performed in 90 percent of patients (n = 22); adipose graft volume ranged from 200 to 1750 ml (average, 600 ml), placed mainly in pectorals, deltoids, and gastrocnemius. High-definition liposculpture is a 360-degree procedure in which intervention must occur in all body segments (or most of them). Then, fat grafting was necessary in some areas to improve the patient's body contour to attain natural and athletic results. No additional data were analyzed for fat grafting, as they were beyond the scope of this article. A nonstandardized survey was achieved in postoperative appointments, with a high satisfaction index, manifested by most patients achieving results "above expectations" (Table 2). Six minor complications were reported (Table 3). Seroma resolved with manual drainage and physical means in both cases. Poor healing because of hypertrophic scars occurred in two cases. One case of inaccurate neoumbilicus location required another surgical intervention, with no further treatment needed. One case of localized surgical-site infection required intravenous antibiotic (cefazolin 1 g intravenously four times per day) and completely resolved after 5-day continuous treatment. No major complications were reported.

DISCUSSION

Abdominoplasty is the preferred procedure to restore the harmony of the body through functional, aesthetic, and reconstructive changes by repairing skin excess, fat, and muscle deformities.[25,26] The number of cosmetic procedures has increased drastically in recent years and, as a consequence, the number of male patients has also been increased.[12,27] Therefore, it is important to emphasize the variants that involve abdominoplasty in

Fig. 7. A 57-year-old man who underwent TULUA HD. The low scar and the defined abdomen display a youthful appearance in the postoperative image (*right*) compared with the preoperative one (*left*). Chest and arms were also treated by high-definition liposculpture.

male patients, caused by lipodystrophy, obesity (because of metabolic and alimentary disorders), and redundant skin secondary to massive weight loss and/or bariatric operations.[13,28]

Physical, anatomical, and even physiologic characteristics impose a therapeutic challenge in men compared to women,[26,29] and clinical gender differences actually exist in the three tissues approached during abdominoplasty: adipose tissue, skin, and muscles.[26] Women have higher levels of adiponectin and leptin than men, which ultimately lead to a visual difference in the fat

Fig. 8. TULUA HD was performed in a 54-year-old male patient. Note the new athletic and muscular appearance of the torso in the postoperative (*right*) compared to the preoperative photograph (*left*). Pectoral and deltoid fat grafting, gynecomastia resection, and arm liposuction were also performed as part of high-definition liposculpture.

Fig. 9. Male patient aged 48 years. TULUA HD was performed successfully and a new abdominal contour was achieved (*right*). No pectoral etching or arm definition was performed. Preoperative (*left*) skin and adipose tissue excess were removed and neoumbilicoplasty was performed.

body distribution.[29] Thus, men have an androgenic distribution of fat (i.e., "apple-type obesity") and women have a gynecologic distribution of fat (i.e., "pear-type obesity").[28] This distinctive feature is essential when performing abdominoplasty in male patient, because liposuction needs special emphasis on the posterolateral flank area (L2 to L4) because of the predominant fat accumulation that normally takes place[26] (Fig. 1, *right*).

Another crucial point to consider is pregnancy, since physiologic changes such as an increase in hormone relaxin occurs, which

Fig. 10. A 43-year-old male patient. We performed TULUA HD (*right*). Notice how the preoperative (*left*) photograph shows adipose tissue accumulation on the abdominal and pectoral regions.

Table 2. Satisfaction Survey

Answer	No. of Patients (%)
Excellent results	17 (70)
Above expectations	4 (16)
Average results	2 (8)
Below expectations	1 (4)
Bad results	0 (0)

Table 3. Complications

	No. (%)
Complication	6
Seroma	2 (8)
Poor scarring	2 (8)
Navel inaccurate relocation	1 (4)
Infection	1 (4)

stimulates the production of metalloproteases that cause a breakdown of collagen and elastin in the extracellular matrix, ensuring the abdominal skin overstretch caused by uterine growth.[30,31] This will cause an increase in intraabdominal pressure, leading to rectus abdominis muscle diastasis.[32] In contrast, male skin is less prone to stretching[26]; however, men could also suffer from muscle diastasis, either congenital or secondary to obesity.[26,33] Parity has been established as the main predisposing factor to it.[34,35] These physiologic and anatomical variants can now be approached in an innovative way through TULUA modifications and high-definition liposculpture. Although it is not mandatory to make a vertical plication, we recommend a transverse plication of the abdominal wall to relieve the pressure of the skin and improve the neovascularization of the flap,[15,17] making not only the wound closure easier but also allowing a greater muscular definition compared to conventional abdominoplasty.[17] Undermining must not be performed below the umbilicus level and is not necessary until the xiphoid, to avoid flap compromise. Smooth definition and superficial carving must be performed carefully, avoiding any overresection of the superficial fat pad. In addition, the vector of correction that redistributes forces over the abdominal wall will lessen the risk of complications such as skin retraction and flap necrosis.[15,17]

As a result of the extensive fat removal from deep and superficial layers in the abdominal wall, a three-dimensional sculpture of the underlying superficial musculature is achieved by high-definition liposculpture. Silk references are essential to predict the final location of the rectus abdominis muscle tendinous intersections after abdominoplasty, as in our experience the fascia retracts at the beginning but typically follows the initial markings rather than new ones built by liposculpture. In this way, an artistic definition of the rectus abdominis tendinous intersections, pectoralis major, external oblique, and latissimus dorsi will grant an athletic, muscular appearance to the final result.[16]

CONCLUSIONS

TULUA HD for the male patient is a safe and reproducible procedure. Still, a long learning curve is mandatory to achieve the desired results. A high level of satisfaction is reported by most patients. As men do not have sequelae of pregnancy (compared to women), the low incidence of rectus abdominis diastasis permits us to perform transverse instead of vertical plication, which is usually performed in conventional abdominoplasty techniques. Transverse plication relieves the skin from pressure, easing the wound closure and decreasing the incidence of flap compromise or necrosis. Also, vascular and nerve integrity is further preserved, as flap undermining is not mandatory as far as the xiphoid process. As a consequence, enhanced definition can be performed over the abdominal muscles, allowing aesthetic surgeons to carve a more athletic and muscular appearance.

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PATIENT CONSENT

Patients provided written consent for use of their images.

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