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ORIGINAL

Umbilical reconstruction without flap after abdominoplasty

Reconstrucción umbilical sin colgajo tras abdominoplastia

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INTRODUCTION

With age and physiological changes, the umbilicus undergoes changes in its shape and location; and it goes from having a verticalized or elliptical shape in adolescence and early youth, to rounded in adulthood, and even flattened or sad at the fifth decade of life. In addition, factors such as trauma or scars from surgery, birth defects, pregnancy, bariatric surgery, scars from piercings and surgical procedures as abdominoplasty influence the navel changes. ⁽¹⁾

The umbilicus is a memory of intrauterine life, it is the first physiological scar, with a predominantly depressed structure. The navel can come in different shapes and sizes, with an average diameter of 1,5 to 2 cm, and greatly contributes to the aesthetic appearance of the abdominal wall. ^(2,3) It is physiologically located in the midline, above a horizontal line joining both iliac crests, about 18 to 20 cm above the beginning of the vulvar commissure. Its presence defines the median abdominal groove and contributes to the curved shape of the lower abdomen, being an important aesthetic element in the abdomen and a symbol of sensuality and beauty in women. Its absence leads to an unnatural abdominal appearance, and an abnormally shaped or misplaced umbilicus may draw undue attention to the central abdomen ^(4,5,6,12,13)

One of the surgical procedures that most affects the aesthetics of the umbilicus is abdominoplasty, ^(3,7,8,9,14) because of several navel modifications, such as: incorrect repositioning, necrosis of the surrounding skin, enlargement of the periumbilical scar and an unsightly appearance. ^(4,5,6,10,11,15) In this sense, umbilicoplasty is a relatively simple and quick procedure designed to change the shape, size, height or location of the navel, with the purpose of improve its natural properties and youthful shape. ^(1,2,12,13,16,17)

The objective of this article is to comment previous umbilical procedures and to describe the results of an umbilical repositioning and restructuring technique without flap after abdominoplasty.

Background

Frequency of abdominoplasty has almost doubled in recent years and is currently the third most common surgical procedure in cosmetic surgery, and reconstruction of the periumbilical region during

surgery is essential for complete patient satisfaction. For the surgeon, it is a challenge to preserve the natural and aesthetic shape of the navel, which includes its proper appearance and location in the abdominal region. ^(1,7,14,18,19,20)

The removal of skin and fat in the lower abdomen during abdominoplasty requires giving the navel a new shape and location. However, it is common to see navels with an unnatural, artificial appearance, accompanied by elongated and unaesthetic scars. The surgeon must be able to achieve a navel with adequate dimensions, attractive, located in the midline, below the middle of the abdomen, retracted, and that appears tense, without laxity in the underlying muscles. It may or may not have the upper fold. A completely round navel or one with a circular scar or one that is too large or flat should be avoided, as it will look artificial. A comprehensive review of the literature shows that the optimal navel should be small, vertically oriented, T-shaped or oval, and hooded above. ^(8,9,10,21,22,23)

Surgeons use a circumumbilical incision to preserve the fixed umbilicus, passing it through a new orifice in the upper abdominal flap. Reinsertion of the umbilicus into the abdominal wall could be performed through a circular, oval, vertical or transverse incision. There is no a unique algorithm for umbilical aesthetics after abdominoplasty and twelve main surgical techniques for umbilical reconstruction after an abdominoplasty procedure have been reported in the literature, which are shown in table 1.

Table 1. Surgical techniques for umbilical remodeling after an adominoplasty procedure

No	Technique	Reference
1	Two lateral rectangular pedicle flaps technique	Sabatier et al, 1978 ⁽⁸⁾
2	Circular flap	Apfelberg et al, 1979 ⁽¹¹⁾
3	Modified unfolded cylinder technique	Ozbek and Ozcan, 2005 ⁽¹²⁾
4	Midline scar.	Franco et al, 2006 ⁽¹³⁾
5	Two lateral rectangular pedicle flaps	
6	Bilobed flap	Sevin et al, 2006 ⁽¹⁴⁾
7	Modified C-V flap technique	Uraloğlu et al, 2006 ⁽¹⁵⁾
8	Double triangular flap and trapezoid flap	Barbosa et al, 2009 ⁽¹⁶⁾
9	Transposition flap and skin graft	Hazani et al, 2009 ⁽¹⁷⁾
10	X-shaped incision that creates 4 V-shaped flaps	Cló and Nogueira, 2012 ⁽¹⁸⁾
11	Scarless neoumbilicoplasty. Lateral horn flaps rotated in opposite directions	da Silva and Sousa 2017 ⁽¹⁹⁾
12	Two rectangular lateral skin flaps	Vallim et al, 2017 ⁽²⁰⁾
	Inner Scar Umbilicus.	Mendes et al 2018 ⁽⁷⁾
	Two lateral rectangular pedicle flaps	

Four reports have described the reconstruction of the umbilicus in vertical or anchor abdominoplasty, when the umbilicus is amputated using techniques with rectangular lateral pedicle flaps. ^(7, 8, 13, 20) Scarless umbilicoplasty techniques have also been reported. ^(19,21) in addition, Ozbek and Ozcan applied in reverse the "deployed cylinder" design, which has been previously reported for nipple reconstruction. ^(12,24,25,26,27)

Barbosa et al described two different strategies for umbilical reconstruction. One of the techniques included four skin flaps and was indicated for patients without a vertical scar on the abdomen; and the second technique with a semilunar skin flap, indicated for patients who had vertical scars. The use of a crescent-shaped incision to create an inferiorly based skin flap that was inserted into the abdominal fascia, with the use of a small full-thickness skin graft to form the upper hood, has also been described. ^(16,28,27,28,29,30,31)

Additionally, a technique that uses a small X-shaped incision that creates four V-shaped flaps, which are sutured to the aponeurosis with absorbable sutures, has been employed in abdominoplasty patients. ^(18,32,33,34,35) Other authors provided an alternative to reconstruct the umbilicus using a purse-string suture

of three defatted flaps, which allowed obtaining a cylindrical umbilicus, without widening, stenosis or external scars. ^(9,36,37,38,39)

Castillo et al. described adding a de-epithelialized flap to reinforce the transposed umbilicus using a Y-shaped design ^(22,23,40,41,42) and Rozen and Redett ^(23,43,44,45) described a two-dermal-flap technique. In a recent article, Tobler et al, combine the concept of local flaps and skin grafts, and reconstructed an umbilicus as a free graft onto a vascularized wound bed. The authors used the patient's own tissue and the time needed to make the flaps and thin the graft is minimal and the technique is relatively simple. ^(24,29,46,47,48)

Always is important to consider four crucial factors: 1) the expertise and experience of the surgeon; 2) the details that arise during umbilical remodeling; 3) to achieve a careful postoperative period and 4) the analysis of the patient's anatomical characteristics. ⁽¹⁰⁾ These characteristics are different in each performed procedure.

A proposal for navel reconstruction technique without flap

In most of the techniques described thus far, the umbilicus remains anchored to the deep abdominal fascia, but is transposed through a newly formed opening in the upper abdominal skin flap. Most surgeons use a circumbilical incision to preserve the fixed umbilicus by passing it through a new hole in the upper abdominal flap. ^(7,8,49,50,51) In the new proposed technique, flaps are not used, the umbilical scar is broken down into an upper and lower triangle that is resected and two lateral triangles of skin remain to make the modifications in the new navel.

The steps of the technique are as follows:

1. Asepsis and antisepsis of the area
2. Height location on the midline where the navel will be.
3. Infiltration with 2 % lidocaine with epinephrine in the area where the navel will be addressed.
4. Despitelization of the place where it will come out of the navel
5. Extraction of the navel through the abdominal flap in the 12 and 6 o'clock position with Allis forceps.
6. Placement of 5:0 Prolene suture in the 3 and 9 o'clock position with "U" stitches.
7. Making triangles which break down the circular scar of the navel at the 12 and 6 o'clock positions.
8. Placement of "U" points at the 12 and 6 o'clock positions.
9. Re-arrangement and tension verification of the new navel.
10. "U" points at the 2 to 5 o'clock and 7 to 10 o'clock positions.

In this technique, the navel is broken down into several vectors and is seated in the epidermis of the abdominal skin, preventing it from retracting towards the bottom. The navel has initially been freed from the abdominal flap that is going to be resected previously, with a size much larger than its natural concentric circular shape. A 1,5 x 1,5 cm triangle is marked, and this ensures that the navel is at minimum tension when it is located in its new location.

The main steps of the technique are shown in the following figures.

As it is a technique that does not involve flaps, advantages can be seen such as: 1) minimal tension in the sutures; 2) taking advantage of the skin management lines in the healing process; 3) greater naturalness; 4) better size adaptability and 5) quick design.

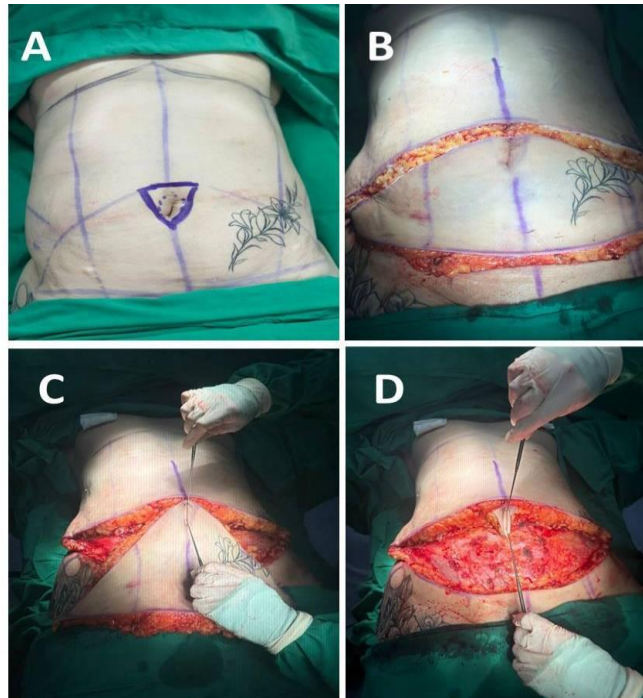


Figure 1. Surgical steps A-D

A: Flap and abdominal midline marking. B: Abdominal flap removal and midline tunnel. C-D: Individualization of the navel three to four mm outside the patient's umbilical ring, this in the shape of a triangle with lower vertex and upper base. D:

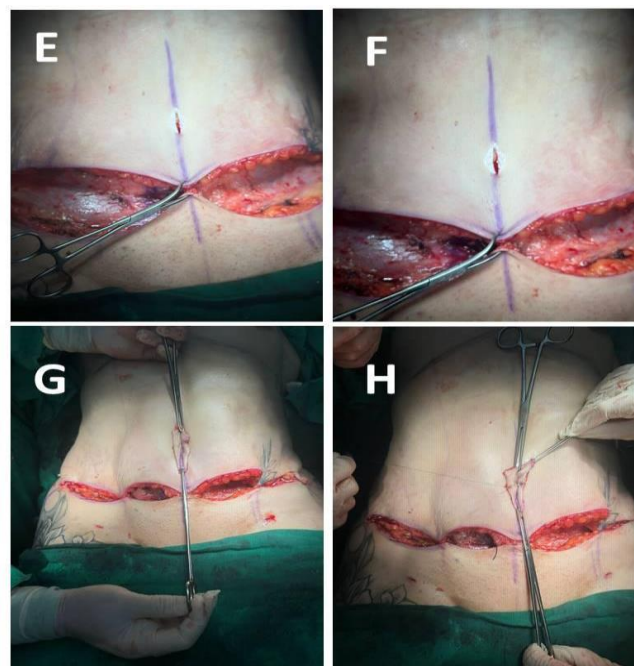


Figure 2. Surgical steps E-H

E: coping of abdominal flap with a backhaus field clamp. F: deepening of the area where the navel projects and a median incision with a scalpel. G: Navel opening with two Allice forceps in the 12 and 6 o'clock position. H: Suture with prolene 5:0 "u" stitches at 3 and 9 o'clock.

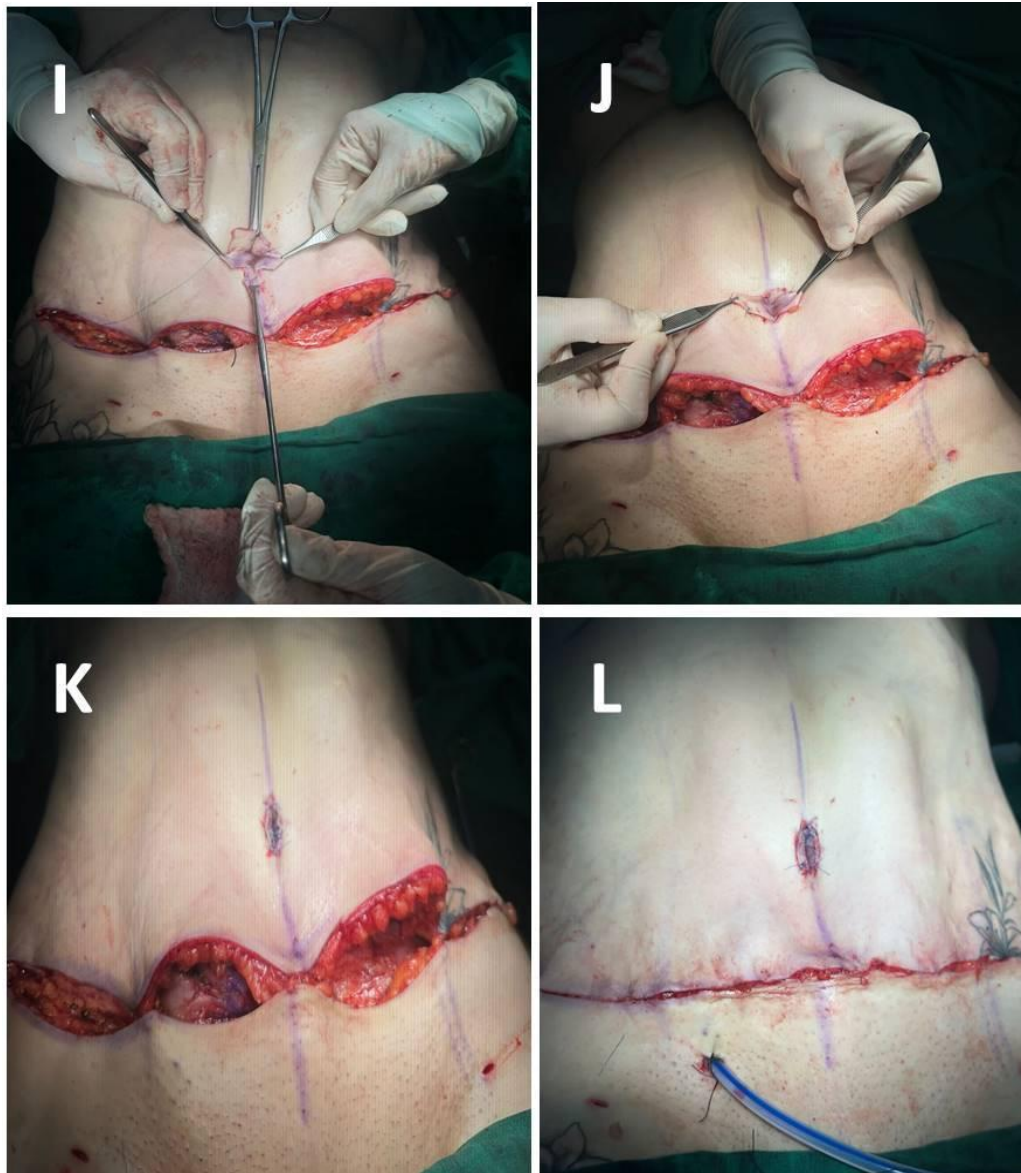


Figure 3. Surgical steps I-L

I-J: removed the skin of the navel in the shape of a triangle with a lower vertex at the top of the navel and a triangle with an upper vertex at the bottom or “6” of the navel. K: Sutures at 12 and 6 o'clock position with 5:0 prolene stitches in U. L: points in “U” at 2 -5-7-11 o'clock position.

RESULTS

Over a period of six years, 537 patients from rural and urban areas of Colombia have been included. The main clinical and demographic variables are shown in table 2.

As shown, the group of female patients, over 40 years of age was the most frequent. BMI greater than 35, classified as grade III obesity, was present in 52,3 % of patients. The most common vascular comorbidity was arterial hypertension.

Table 2. Clinical and demographic variables of patients included in the study		
Variables		N (%)
Patients		537 (100)
Age range (years)	20-39	130 (24,2)
	40-50	238 (44,3)
	50-60	169 (31,5)
Sex	Female	529 (98,5)
	Male	8 (1,5)
BMI	28-34,9	113 (21,0)
	35-39,9	281 (52,3)
	>40	143 (26,7)
Vascular conditions	HT	219 (40,8)
	DM	103 (19,2)
	Smoking	68 (12,7)

BMI: body mass index

HT: arterial hypertension

DM: diabetes mellitus

Figure 4 represents the main complications presented in the patients included in the study. As seen, they were very infrequent, with hypertrophic scar and suture dehiscence being the most common in 63 and 51 patients respectively.

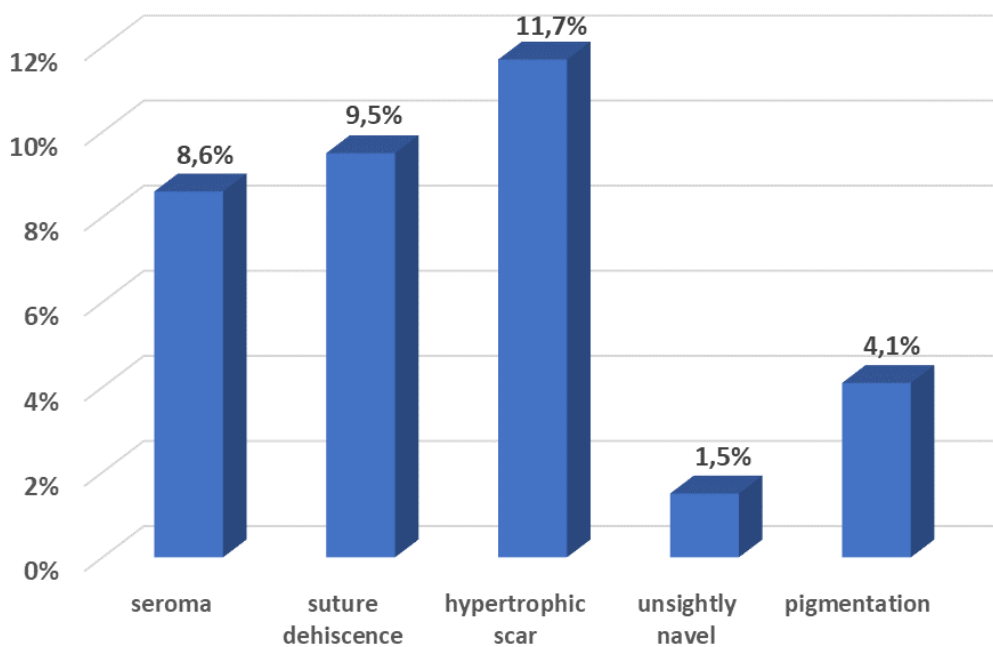


Figure 4. Complications presented in the patients included in the study

No other complications such as infection, necrosis or stenosis were reported, and many patients exposed to the new technique showed a new, natural umbilicus, with pleasant shapes and correct position.

When applying the Likert scale to evaluate satisfaction, 504 (94 %) patients were satisfied or very satisfied; and only 16 subjects (2,9 %), were unsatisfied with the new surgical procedure.

DISCUSSION

The technique described is different from those previously reported in the literature, as it does not require flaps. Although it is necessary to follow a precise design to achieve an umbilicus with a natural and aesthetic shape.

In 2018, when the surgical procedure started in the plastic surgical service, one of the most frequent complications was umbilical dehiscence, perhaps related to the removal of a larger area of subcutaneous tissue, and therefore less vascularized. The hyperpigmentation was presented in few patients due to excessive sun exposure, for not complying with the postoperative indications. Over the years, the occurrence of complications has been drastically reduced, with better umbilical reconstruction, based on the expertise of surgeons, achieved with practice and knowledge.

In the revised literature, other complications such as umbilical stenosis, umbilical or skin flap necrosis, scar hypertrophy and transient skin erythema had been reported. ^(25,52,53,54) Additionally, sometimes a deep neo-navel cannot be achieved, resulting in a flat navel and hiccups or numbness around the neoumbilical scar. ^(26,27,55,56)

Although the several described techniques for umbilicus reconstruction, the expected achievement, during abdominoplasty, is to create a natural-appearing umbilicus with a permanent and sufficient depression with minimal scarring. ^(27,57,58,59,60) There have been few extensive or comparative studies that demonstrate which technique is the most effective, so the choice is in many cases based on the surgeon's experience.

In summary, the described technique shows positive aesthetic results, with a low frequency of complications and a high degree of patient satisfaction, without a considerable increase in surgical time.

CONCLUSION

The umbilicus reconstruction technique without flap provides positive aesthetic results, with a low frequency of complications and a high degree of patient satisfaction.

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