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ORIGINAL ARTICLE BODY CONTOURING

Improvement on the Neo-umbilicoplasty Technique and Review of the Literature

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Abstract

Introduction The umbilicus is an important component of body esthetics, and its absence or dysmorphia may give rise to psychological discomfort, making it a common concern in surgical planning. Many techniques of umbilicus reconstruction have been proposed, each with its own limitations in terms of esthetics, risk of stenosis or final positioning. Reconstruction techniques may involve skin grafting, cartilage, purse-string suture and flaps. One of the most promising approaches is scarless neo-umbilicoplasty.

Objective To improve the technique of neo-umbilicoplasty, creating a deeper and more natural-looking umbilicus, and propose a reoperation technique for shallow umbilici.

Patients and Methods The sample consisted of 108 patients aged 25–67 years submitted to abdominoplasty and scarless neo-umbilicoplasty under epidural anesthesia performed by the same surgeon and at the same hospital between July 2013 and October 2015.

Results Follow-up lasted from 6 to 24 months. The new umbilici were scarless.

Discussion Many different techniques may be used to reconstruct the umbilicus. The main purpose is to create an adequately localized structure with a natural, youthful appearance and minimal scarring. To do so, we used ten (rather than six) attachment stitches and mobilized the adipose tissue toward the center of the new umbilicus to achieve greater depth, even in lean patients. Techniques which involve suturing the umbilical stalk onto the incised skin of the abdominal flap tend to produce unesthetic results, such as visible scars and umbilical skin islands of varying size. Scarless neo-umbilicoplasty does not require suture removal and poses no risk of dehiscence, secretion or umbilical stenosis, as observed with other techniques.

Conclusion The localization of the new umbilicus in the space between the rectus abdominis muscles, the use of ten rather than six stitches and the mobilization of the adipose tissue toward the periumbilical area constitute an improvement on the neo-umbilicoplasty technique. The resulting umbilici were scarless and very natural-looking.

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Keywords Abdominoplasty · Umbilicoplasty · Umbilicus reconstruction · Scarless technique

Introduction

The umbilicus is an important component of body esthetics. Its absence or dysmorphia may give rise to psychological discomfort, making it a common concern in surgical planning [1–4]. The main challenge of umbilicus reconstruction is to create a new and natural-looking structure with minimal scarring [5, 6]. Many techniques

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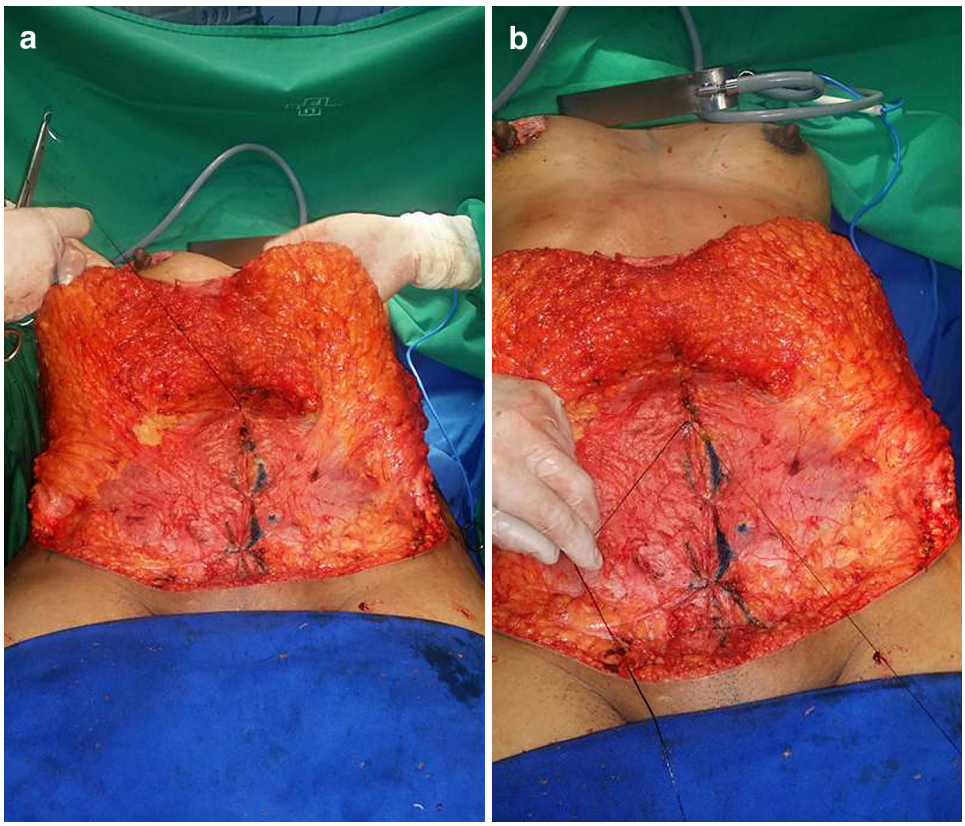

Fig. 1 Plication of the rectus abdominis muscles down to 1.0 cm from the position of the new umbilicus (**a**). Plication is resumed 3.0 cm below this point and proceeds to the lower portion, near the pubis (**b**). In the area between the upper and lower plicated portions, a space is created for the construction of the new umbilicus

have been proposed, each with its own limitations in terms of esthetics, risk of stenosis or final positioning [1, 4, 7–10]. The most esthetically pleasing shape is vertical [9–11].

Reconstruction techniques may involve skin grafting, cartilage, purse-string suture and flaps. The latter include the spiral rotation flap, the V-shaped flap, the tubularized flap, the umbilical C-V flap, the island flap, the reverse fan-shaped flap, the upper inverted omega-shaped flap and the lower lazy M-shaped flap. There are also techniques using three triangular skin flaps, diamond-shaped skin flaps, superior-based single triangular flaps, transverse flaps, inferior-based vertical flaps, or the combination of skin flaps and cartilage grafts [5, 9, 11–13].

In the 1960s, a number of umbilicoplasty techniques with reduced scarring were introduced. Kirianoff [7] and Schoeller et al. [4] performed scarless umbilicoplasty, deepidermizing and fastening the original umbilical stalk on the abdominal flap. Santanelli et al. [14] amputated the umbilical stalk and fastened the incised abdominal flap on the abdominal wall for healing by second intention. Abreu [15] and Amud [16] proposed a completely scarless technique producing a natural-looking structure (neo-umbilicoplasty), but with increased risk of flattening. This paper presents an improvement on that technique capable of producing a deeper and more natural-looking umbilicus, along with a reoperation technique for patients with shallow umbilici.

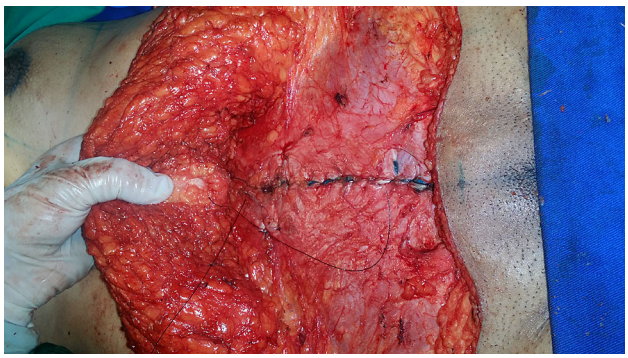

Fig. 2 Fat on the abdominal flap reserved for the new umbilicus is incised and divulsed to denude a 2-cm^2 area of dermis

Patients and Methods

The sample consisted of 108 patients (107 females) aged 25–67 years submitted to abdominoplasty and scarless neo-umbilicoplasty under epidural anesthesia performed by the same surgeon and at the same hospital between July 2013 and October 2015. In the analysis, the technique, its complications and the aesthetic result were considered.

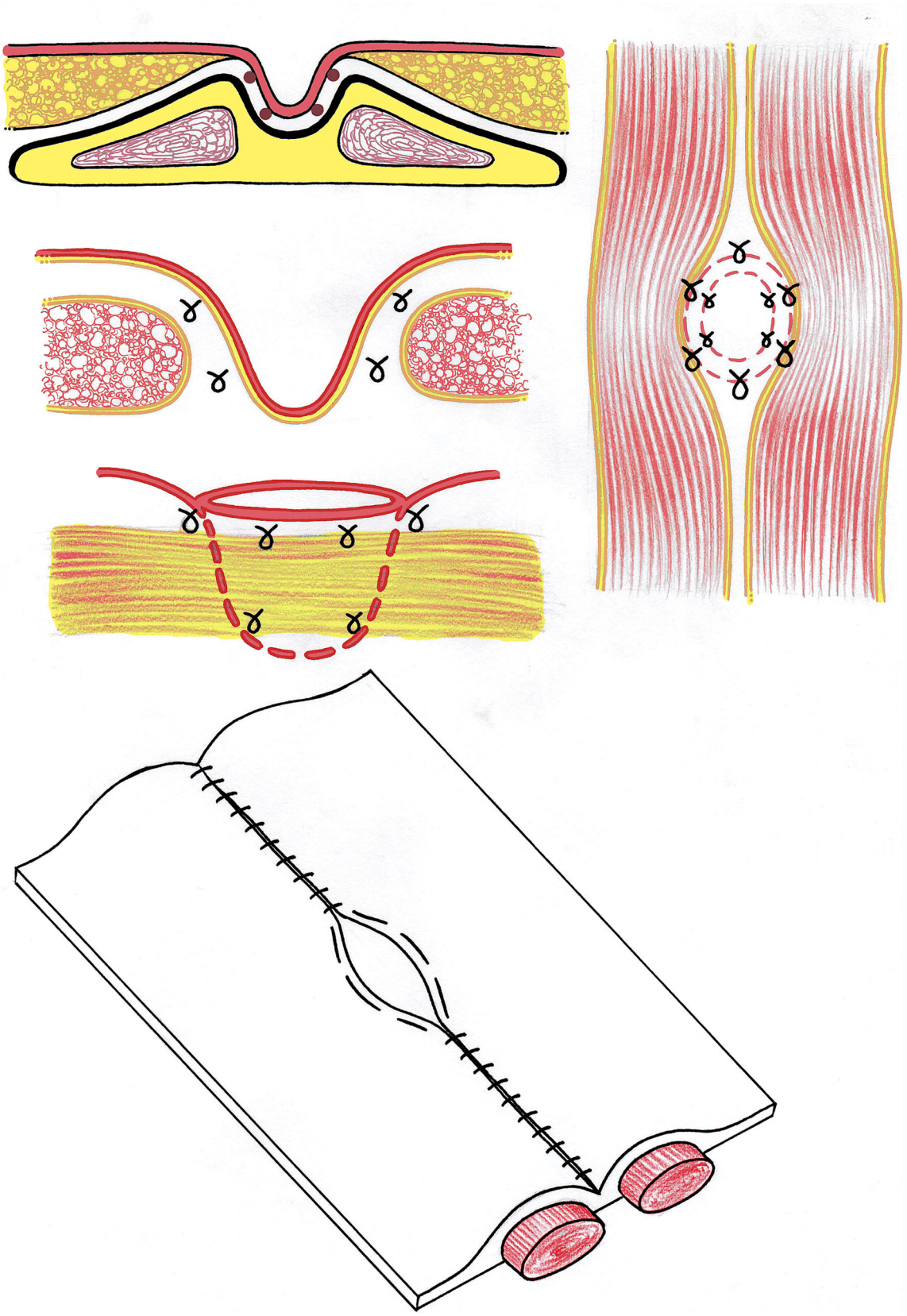

Fig. 3 Sequence of view of the attachment stitches (transverse, profile and front)

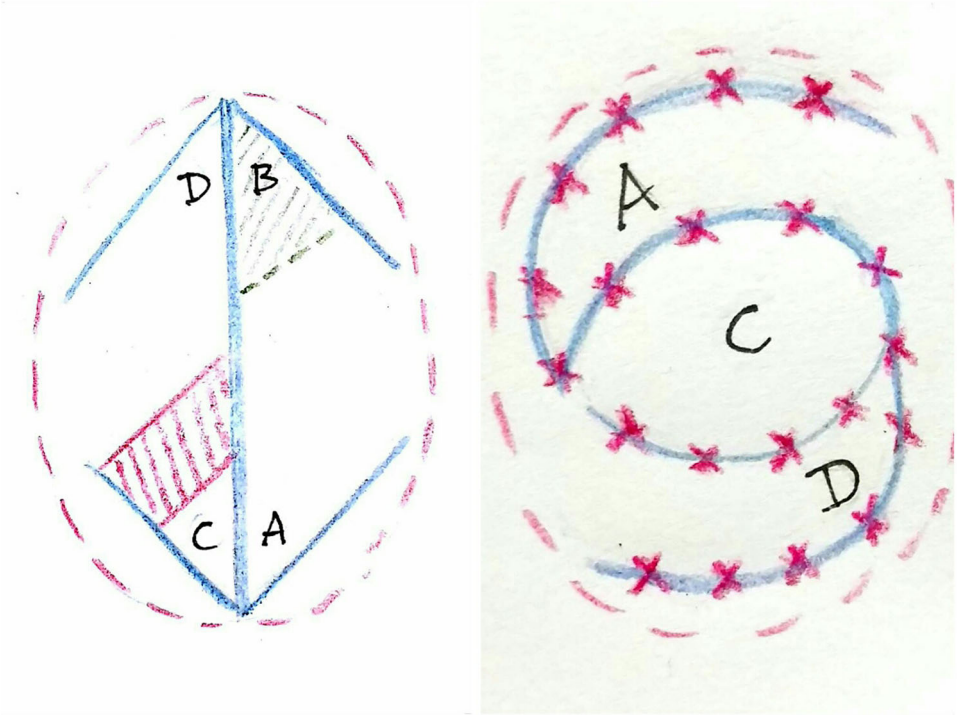

Fig. 4 In cases that the umbilicus is too shallow, it may be reconstructed using local lateral horn flaps rotated in opposite directions

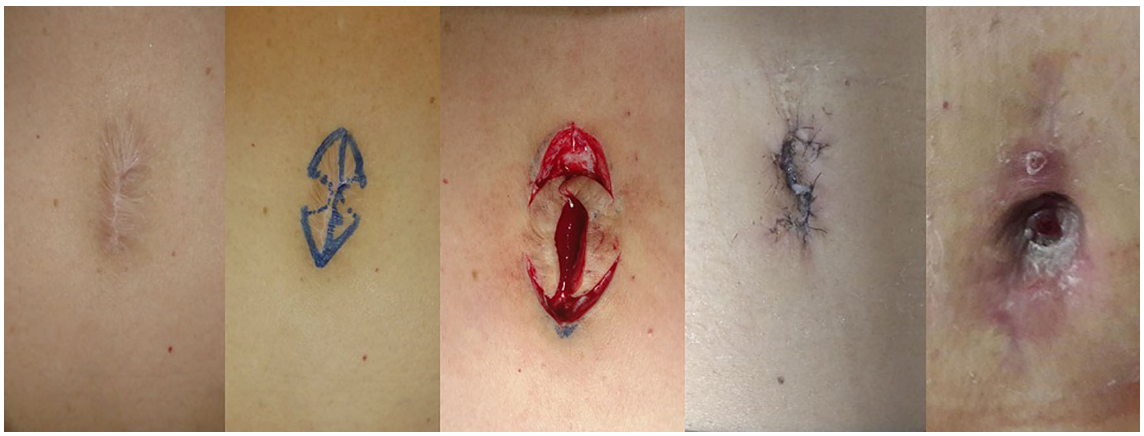

Fig. 5 Sequence of the reconstruction by local lateral horn flaps

Patients with chronic diseases, smokers and receiving fleur-de-lis abdominoplasty or umbilicoplasty with abdominal flap incision were excluded.

Surgical Technique

The abdominoplasty is initiated with a low transverse pubic incision, followed by cutaneous dissection as far as the xiphoid process and plication of the rectus abdominis muscles down to 1.0 cm from the position of the new umbilicus. Plication is resumed 3.0 cm below this point and proceeds to the lower portion, near the pubis. In the area between the upper and lower plicated portions, a space is created for the construction of the new umbilicus (Fig. 1). Separate attachment stitches are made to join the flap to the aponeuroses of the rectus abdominis muscle [17] near the position of the new umbilicus.

The fat on the abdominal flap reserved for the new umbilicus is incised and divulsed to denude a 2-cm^2 area of dermis. Using mono-nylon thread size 2.0, a stitch (#1) is placed centrally (Fig. 2), above the space, followed slightly below by one stitch on each side (#2 and #3), deep in the space created between the plicated portions, transfixing the dermis by 2 mm. To reinforce the perception of depth,

Fig. 6 Preoperative and postoperative appearance (60 days)

Fig. 7 Preoperative and postoperative appearance (30 days)

another and more external pair of stitches (#4 and #5) are placed in line with stitches #2 and #3, near the upper edge of the umbilical cavity. This 5-stitch design is mirrored in the lower half of the space, totaling ten stitches (Fig. 3).

Additional attachment stitches are made on each side of the new umbilicus to traction the flap tissue medially, deepening the umbilicus by leaving the periumbilical portion with a thicker layer of fat. The entire flap is stitched in this manner, and a continuous suction drain is installed. Excess abdominal skin to be excised is marked and the surgical wound is closed layer by layer. Patients are required to wear an umbilical silicone orthosis for the first 4 months after surgery.

If the patient feels the new umbilicus is too shallow, it may be reconstructed using local lateral horn flaps rotated in opposite directions. This technique of umbilical wall reconstruction increases the perception of depth (Figs. 4, 5).

Results

During the study period, 108 patients (107 women) aged 25–67 years were submitted to abdominoplasty followed by neo-umbilicoplasty. The resulting umbilici had no visible scars. Follow-up lasted from 6 to 24 months (Figs. 6, 7, 8, 9).

Twenty-five patients (23%) developed epidermolysis at the bottom of the umbilicus, which healed by second intention, without intervention. Eight of these patients had

Fig. 8 Preoperative and postoperative appearance (60 days)

Fig. 9 Preoperative and postoperative appearance (60 days). The patient was photographed in underclothes to highlight the natural appearance of the umbilicus. The scar from the abdominoplasty is easily hidden

flattened umbilici, 5 developed a hypertrophic scar at the bottom of the umbilicus, and 12 healed without sequelae.

Umbilical flattening occurred in 32 cases (29%), probably as a result of dehiscence or dermal detachment from the abdominal aponeurosis. Twelve of these were obese patients who lost an average of 6 kg during the first 6 months of follow-up.

Discussion

An absent or deformed umbilicus is deemed unattractive and may give rise to psychological distress. Many different reconstruction techniques have been proposed (skin grafting, cartilage, purse-string suture, flaps) but creating an adequately localized structure with a natural, youthful

appearance and minimal scarring can be challenging [18]. More recently, much attention has been given to scarless neo-umbilicoplasty due to its favorable esthetic outcomes [5, 9, 11, 12, 15, 16].

The stitching technique used by Park et al. and Lee et al. to attach the flap and the aponeuroses of the rectus abdominis muscle and preserve the depth of the new umbilicus longer are also important in neo-umbilicoplasty [5, 12]. As with other techniques, the absence of attachment stitches increases the risk of flattening. To minimize this risk, we used ten stitches, as opposed to the six stitches used by Abreu [15]. In addition, by mobilizing the adipose tissue toward to center of the new umbilicus, greater depth was achieved, even in lean patients. The flattened umbilici observed in some of our obese patients may be explained by the stronger tension exerted on the attachment stitches of the aponeuroses because of the greater thickness of the panniculus or because of weight loss during follow-up (decreasing thickness of adjacent tissues). Moreover, flattening may occur postoperatively due to rupture or weakening of the attachment stitches in patients who get insufficient rest. In very thin cases, the new umbilicus becomes shallower because the periumbilical fat thickness does not allow a satisfactory depth impression. Because of this, it may be contraindicated if the abdominal flap is less than 1 cm or greater than 5 cm.

Techniques which involve suturing the umbilical stalk onto the incised skin of the abdominal flap tend to produce unesthetic results, such as visible scars and umbilical skin islands of varying size [19]. Scarless neo-umbilicoplasty does not require suture removal and poses no risk of dehiscence, secretion or umbilical stenosis, as observed with other techniques [5, 10, 11, 15, 18, 20].

Amud (2008) described a technique of scarless neo-umbilicoplasty with six sutures in a hexagonal pattern using mono-nylon thread size 2.0. However, by resecting the fat instead of divulsing it, Amud [16] exposed the dermis of the new umbilicus to greater risk of skin damage and, consequently, flattening, necrosis and hypertrophic scarring. More recently, Abreu (2010) used divulsion instead of resection, followed by six sutures with mono-nylon thread size 3.0, achieving more natural outcomes and less flattening [15]. Rather than transfixing the dermis at the most superficial level of the plication of the rectus abdominis, Alexander transfixed it more internally, giving the new umbilicus an appearance of greater depth. The remaining umbilical stalk was closed at the base using mono-nylon thread size 3.0 to reduce the risk of hernia.

The four stitches on the border of the aponeuroses on each side and the six sutures used to create the umbilicus increased umbilical depth and helped prevent rupture of the suture, in addition to yielding a more natural outcome. The attachment stitches on the detached abdominal flap helped reduce tension on the sutures of the new umbilicus.

The bilateral horn flap technique used to reconstruct the umbilical wall was found to be a good alternative to correct shallow umbilici. As with the attachment stitches used by Park et al., in this technique attaching the flap segments to the aponeuroses of the rectus abdominis muscle is very important.

Conclusion

The localization of the new umbilicus in the space between the rectus abdominis muscles, the use of ten rather than six stitches and the mobilization of the adipose tissue toward the periumbilical area were shown to improve the outcome of the neo-umbilicoplasty technique. In addition, the bilateral horn flap technique efficiently corrected umbilical flattening by allowing the umbilical wall to be reconstructed.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest to disclose.

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