

## Abstract

**Purpose:** Vascular compromise of the neo-umbilicus during abdominoplasty can lead to neo-umbilical necrosis and deformity, thus jeopardizing aesthetic results. During routine abdominoplasty, the umbilicus is released from the surrounding skin to allow for mobilization of the abdominal skin. This step results in disrupting vascular inflow to the umbilicus from the surrounding skin subdermal plexus and therefore limiting vascular inflow through the proximal umbilical stalk. Additionally, umbilical fixation to the abdominal muscle and fascia is required prior to umbilical skin paddle in-setting in order to achieve a hidden and aesthetically pleasing umbilical surgical incision ring. Previous fixation techniques have described suturing of the proximal umbilical stalk to the abdominal fascia, potentially further compromising vascular flow through the proximal umbilical stalk. This paper presents a modification of the umbilical stalk fixation technique which minimizes compromise of the vascular inflow through the proximal umbilical stalk.

**Methods:** A modified distally based umbilical stalk fixation is described in 10 consecutive abdominoplasty patients. The modified umbilical stalk fixation technique utilizes a distally based de-epithelialized dermal ring which is used for suturing of the umbilical stalk to the abdominal fascia. The desired umbilical skin paddle is set at 1.5 to 2cm in diameter and the distally based de-epithelialized ring is set at 1cm in width prior to mobilization of the abdominal skin. Following release of this umbilical complex and plication of the midline abdominal fascia, the distally based de-epithelialized ring is fixed to the abdominal muscle and fascia using horizontal mattress stitches. Following redraping, trimming, and in-setting of the abdominal skin flap, the neo-umbilicus is created as a vertically oriented oval aperture; this aperture is then inset to the umbilical skin paddle using interrupted subdermal stitches and interrupted simple skin stitches.

**Results:** A modified distally based umbilical stalk fixation technique is described in 10 consecutive abdominoplasty patients. No patients demonstrated umbilical stalk compromise or necrosis and all umbilical incision lines and rings were hidden within the umbilical shadow. All patients demonstrated aesthetically pleasing abdominoplasty results with a hidden neo-umbilical ring.

**Conclusions:** The above modified distally based umbilical stalk fixation technique minimizes vascular compromise to the neo-umbilicus while providing aesthetically pleasing abdominoplasty results.

## Introduction

The reconstruction of the umbilicus is an essential component of abdominoplasty. Its purpose is to improve as well as rejuvenate the appearance of the abdomen. Moreover, it corrects the changes that have occurred to the abdomen from abdominal diastasis. While the lower transverse scar is hidden by the swimsuit line, the neo-umbilicus is a major focus on the abdomen when bearing the midriff. A ring-shaped scar or a deformed umbilicus can detract from the aesthetic values of a newly shaped abdomen. The belly button, upon looking at the abdomen, is the first structure of the abdomen to be seen. Even though the belly button has no specific function, it is critical to

an overall good looking abdomen. Because the umbilicus is so important to the abdomen's aesthetic appearance and contour, the focus of the reconstruction of the umbilicus is to restore it to its most natural form. A small retrusion that is both vertically oriented and T-shaped are considered ideal shapes.<sup>i</sup> The creation of a neo-umbilicus without it appearing like an operated belly button has always been the main goal of plastic surgeons. Techniques have been developed to create a new aesthetically pleasing umbilicus while concealing the scar inside the cavity.<sup>ii</sup> These techniques, however, can compromise vascular supply to the umbilicus, leading to wound healing problems and umbilical necrosis. Moreover, common drawbacks from previous surgeries were the



**Figure 1.** An operated belly button that demonstrates the typical as well as the traditional abdominoplasty technique used prior to the discovery of the new method. The previously used technique resulted in the visibility of the surgically repaired oval ring, as shown.

incisions and scars that were left behind near the surroundings of the neo-umbilicus (Figure 1). Perfusion to the infraumbilical area following abdominoplasties performed using the standard Regnault W-technique was found to decrease on average by 82.8 %.<sup>iii</sup>

Besides the subdermal plexus, the umbilicus also gets arterial flow from the deep inferior epigastric vessels, the median umbilical ligament, as well as the ligamentum teres hepaticum.<sup>iv</sup> Perforator vessels branch off of these in a diverging upward direction toward a vessel plexus beneath the umbilicus and the subdermal plexus. Each of the main trunks will split in a medial and a lateral branch.<sup>iv-v</sup> When the umbilicus is incised, these vessels can be severed, decreasing perfusion to the umbilicus. The small caliber of these vessels can also increase the chance of damage due to mechanical stress during surgery.<sup>vi</sup> An umbilical incision line with a greater diameter will increase vascular supply by reducing the amount of severed or damaged vessels distal to the umbilicus. In this report, the author presents a new technique that involves excising a de-epithelialized ring around the umbilicus and suturing the dermis of this ring to the rectus fascia. This technique produces great aesthetic results and allows the belly button to appear



**Figure 2.** The umbilicus and the oval ring were drawn on the abdomen surface before performing abdominoplasty. The de-epithelialization of the ring will occur. Creating this mark gives the surgeon an idea of where the incisions will take place.



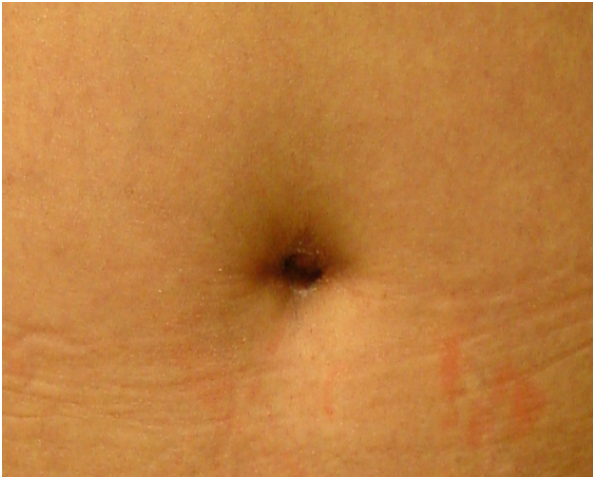
**Figure 3.** This is the excision of the oval ring that was drawn around the umbilicus. The oval opening was cut and the umbilical was brought out. Following that, the lifting and plication of the belly was done.

more natural while maintaining vascular flow.

## PATIENTS AND METHODS

### Surgical Technique

At the beginning of the abdominoplasty, the umbilicus is marked and an oval ring is



**Figure 4.** A belly button after abdominoplasty performed with the new technique and proximal fixation stitches. This technique pulls the stock down and ensures that the ring is not shown.

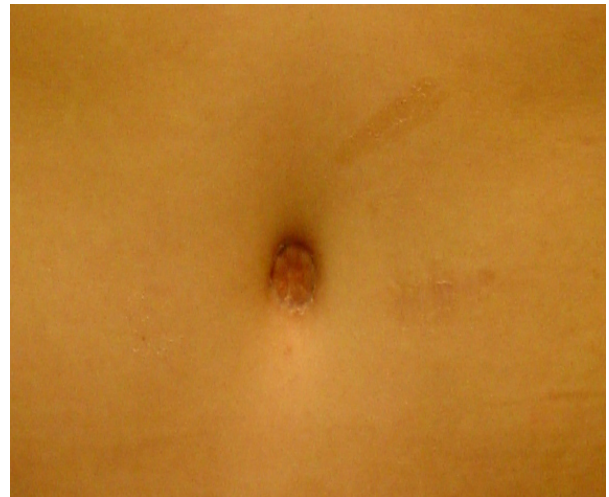
drawn around it (Figure 2). This ring is then de-epithelialized. The umbilicus is excised around the outside of this ring (Figure 3). Following the de-epithelialization of the ring, the belly was lifted up and then plicated. After the abdominal flap is retracted and plication is complete, the dermal extension of the umbilical ring is sutured to the rectus fascia (Figure 7). Instead of taking the dermal bites of the proximal stalk, the flap of the dermis was sewn down. By doing this, it will fix the belly button without compromising the blood flow. This is done using a horizontal mattress stitch with 3-0 Mersilene. The abdominal flap is then tailored and sutured to the midline of the pubic area as usual. A new umbilical aperture is made with an oval incision to match the shape of the umbilical ring and the umbilicus is exteriorized. The dermis of the aperture is sewn to the dermis of the umbilical ring using a subcuticular stitch with 3-0 PDS. Finally, the epidermis of the umbilical aperture and umbilicus is sewn together using 5-0 Nylon simple stitches which will be removed in 12 days.

## RESULTS

This technique has been performed on

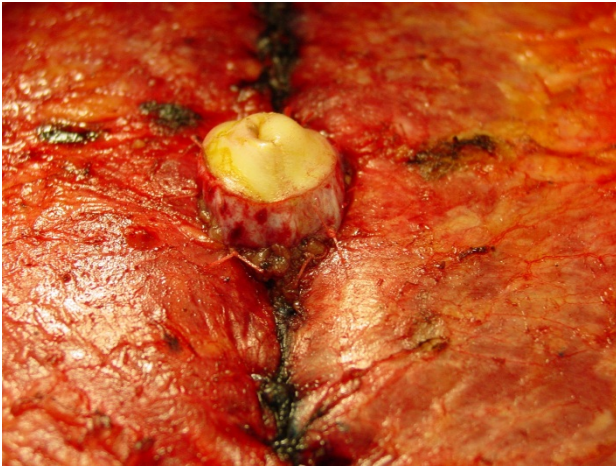


**Figure 5.** This is an example of another patient's belly after the new technique. The abdominal contour changes from pregnancy or weight gain and loss, also known as abdominal diastasis, was corrected and modified.



**Figure 6.** This is an example of an optimum belly button that does not constrict blood flow. The modified distally based umbilical stalk fixation that is newly developed ensures that vascular flow to the umbilical end is not compromised.

10 abdominoplasty patients with no complications. All of the patients resulted with aesthetically pleasing new abdomens and umbilici. There were no visual umbilical scars.



**Figure 7.** The umbilical ring that is sutured down to the rectus fascia after retraction and plication of the abdominal flap. The recreation of a new umbilicus will take place in the final step of the surgery.

## DISCUSSION

The goal of the reconstruction of the umbilicus during abdominoplasty is to create an aesthetically pleasing umbilicus without conspicuous scarring and with adequate perfusion (Figures 4, 5, 6). In addition to that, another purpose of abdominoplasty is also to re-establish an aesthetically pleasing and tightened abdominal contour. Although abdominoplasty have demonstrated noteworthy success, past techniques have left umbilical scars in addition to the creation of an unnatural looking belly button (Figure 1). Common characteristics of many popular techniques include suturing the dermis of the umbilicus several times to the rectus fascia in order to create a cavity. This, however, might damage perforator vessels and decrease perfusion to the umbilicus. One of the complications of tummy tucks is how easy the belly button can be damaged if the procedure is not performed meticulously.

Once it is impaired, a belly button reconstruction surgery has to take place and it will never look as natural and pleasing again. Not only will the subdermal plexus be cut, but there will also be bites taken out of the stalk

proximally when the stitches are taken off. Every piece of tissue has two types of blood flow: the horizontal network and the blood flow coming from underneath up. In theory, if the surgeon goes around the stalk and pulls the perforator down, the blood flow will be constricted. This proposed technique excises the umbilicus with a de-epithelialized ring around it, creating a larger diameter which allows more blood to flow through. The dermis of this ring, instead of the umbilical stalk, is sutured to the rectus fascia, decreasing the amount of damaged perforator vessels. Also, the tighter it is sutured down, the better the results will turn out to be (Figures 4, 5, 6).

In addition to having more blood flow, this new and unique technique ensures that the patients have the most satisfying and natural looking belly button. Moreover, it is also very important to make sure that the belly button gets sufficient blood flow. In order to do this, proximal fixation stitches were used. The stalk was pulled down to prevent it from sticking out and being visible. Once it is pulled down, it will cave in like a dent to make it look more natural and never operated. It does not matter what is distal to the belly button because the most important thing is that it gets the blood flow that it needs. Additionally, a modified distally based belly button fixation procedure was proposed and performed.

In contrast to how abdominoplasty used to be done, this new procedure allows an aesthetically pleasing and more natural looking belly button ring, which is also known as an “innie.” Furthermore, it will also prevent the blood flow through the belly button from being compromised.

## CONCLUSION

Knowledge of the anatomy of the abdomen is crucial to surgeries like abdominoplasty. By excising a de-epithelialized ring around the umbilicus and suturing the dermis of this ring instead of the umbilical stalk, the new reconstructed umbilicus is able to receive more perfusion. This technique creates a more normal-appearing, oval-shaped cavity

with no visual scarring. This technique has been performed on 10 patients with no complications. In addition, there were no umbilical end recovering difficulties. With this knowledge, other plastic surgeons can use this newly proposed procedure on future patients to ensure the most pleasing result, thus making it an advancement in the field of plastic surgery.

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- i Craig, S. B., Faller, M. S., and Puckett, C. L. In search of the ideal female umbilicus. *Plast. Reconstr. Surg.* 105: 389, 2000.
  - ii Massiha, H., Montegut, W., Phillips, R. A method of reconstructing a natural-looking umbilicus in abdominoplasty. *Ann. Plast. Surg.* 38 :228-231, 1997
  - iii Mayr, M., Holm, C., Hšfter, E., Becker, A., Pfeiffer, U., and Mühlbauer, W. Effects of aesthetic abdominoplasty on abdominal wall perfusion: A quantitative evaluation. *Plast.*

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- Reconstr. Surg.* 114: 1586-94, 2004.
  - iv Stokes, R. B., Whetzel, T. P., Sommerhaug, E., Saunders, C. J. Arterial vascular anatomy of the umbilicus *Plast. Reconstr. Surg.* 102: 761-4, 1998.
  - v El-Mrakby HH, Milner RH. The vascular anatomy of the lower anterior abdominal wall: a microdissection study on the deep inferior epigastric vessels and the perforator branches. *Plast Reconstr Surg.* 109:539—43. discussion 544—547, 2001
  - vi O'Deya, D.M., Heimburga, D.V., Prescherb, A., Palluaa, N. The arterial vascularisation of the abdominal wall with special regard to the umbilicus. *The British Association of Plastic Surgeons.* 57: 392–397, 2004