



# Neoumbilicoplasty technique offers a more natural and easier performance result: a retrospective observational study (more than 2,500 patients) supported by a concise systematic review

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## Abstract

**Introduction:** In the aesthetic scenario after abdominoplasty, umbilicoplasty stands out, as the navel forms the central aesthetic subunit of the abdomen, and it needs to be aesthetically pleasing. Thus, neoumbilicoplasty describes the creation of a navel again. The ideal umbilical reconstruction should be reliable, reproducible, aesthetically appropriate, and associated with low morbidity, as well as single-stage.

**Objective:** It was to present a neoumbilicoplasty that uses a part of the native umbilicus, leaving the final scar with a hexagonal aspect, to provide a more natural and easy-to-perform result. **Methods:** This retrospective observational study on the analysis of the neoumbilicoplasty technique selected the results of six patients who underwent an abdominoplasty. The skin where the neo-navel was placed was incised in the shape of an X, for a perfect accommodation of the flaps and sutured. It is noteworthy that this technique has already been performed in more than 2,500 patients by the plastic surgeon in the present study, and all cases were successfully performed. The presentation of the neoumbilicoplasty technique consisted of keeping a part of the native umbilicus, leaving the final scar with a hexagonal appearance, with a very low level of occurrence of hypertrophic scarring, providing a more natural and easy-to-perform result. **Results:** This study demonstrated the success of the procedures in maintaining a part of the native umbilicus, with a final scar in a hexagonal aspect, and practically without the occurrence of hypertrophic scar, contributing to another advance in the quality and improvement of neoumbilicoplasty and patient satisfaction. According to

the systematic review supporting the present study, it was found 105 articles involving neoumbilicoplasty. A total of 32 articles were fully evaluated and 11 clinical studies were included and developed in the systematic review. These studies did not present a risk of bias that could compromise the results presented, however, there is still no ideal and standardized technique for neoumbilicoplasty in abdominoplasty. **Conclusion:** The neoumbilicoplasty technique of this study presented all the necessary characteristics for an aesthetically favorable umbilicus, maintaining a part of the native navel with a hexagonal scar, providing a more natural and easy-to-perform result.

**Keywords:** Plastic surgery. Neoumbilicoplasty. Abdominoplasty. Natural result.

## Introduction

In the aesthetic scenario after abdominoplasty, umbilicoplasty stands out, as the navel forms the central aesthetic subunit of the abdomen, and it needs to be aesthetically pleasing [1]. In this sense, the main characteristics of an aesthetically pleasing navel include small size, vertical orientation, and superior hood [2-4].

In this context, umbilicoplasty in abdominal contouring procedures involves the repositioning and insertion of the navel after excision of excess skin and subcutaneous tissue with or without plication of the abdominal wall, to project an aesthetically pleasing navel [5-7]. In this regard, loss of the umbilicus can be an embarrassing deformity, and this is occurring more frequently after abdominoplasty, tumor excisions, and flap mobilization. Thus, neoumbilicoplasty describes the

creation of a navel again. The ideal umbilical reconstruction should be reliable, reproducible, esthetically adequate, and associated with low morbidity, as well as single-stage [8].

As literary support of the different types of techniques for neoumbilicoplasty, a systematic review study gathered articles to analyze and compare published techniques to establish a new standard in creating the perfect belly button in the abdominoplasty scenario. 10 techniques were found, and 9 techniques were performed a round, oval or vertical ellipse pattern on the navel. Of these 9 techniques, 4 of them (44.4%) subsequently modified the round navel with an inferior or superior excision to create a "U" or "inverted U" shaped navel. As for the shape of the incision made in the abdominal flap for umbilical reinsertion, the most common were the rounded or inverted "V" or "U" incision, both with 4/10 (40%) and 3/10 (30%), respectively. Furthermore, 80% of the studies described cutting the subcutaneous adipose tissue around the incision to create a periumbilical concavity after insertion of the umbilicus. Also, 40% of the techniques described suturing the dermis from the umbilical skin to the fascia of the rectum. Furthermore, 30% advise that plication of the peduncle is a necessary step for their technique, and 77.8% opted for indissoluble sutures for skin closure [9].

Therefore, despite the current literature on umbilicoplasty, a reliable technique with a simple learning curve that achieves consistent and reproducible results in a wide variety of patients has not yet been written, so the present study aimed to contribute to this information gap by presenting a neoumbilicoplasty which uses a part of the native navel, leaving the final scar with a hexagonal aspect, to provide a more natural and easy-to-perform result.

## Methods

### Presentation of the Neoumbilicoplasty Technique

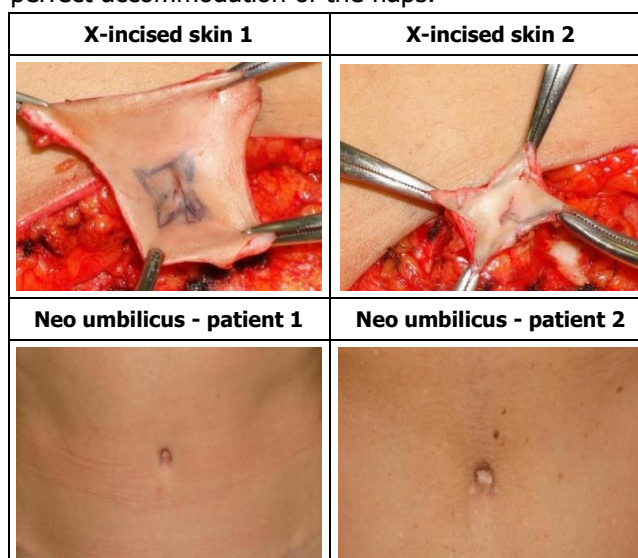
The present observational retrospective study on the analysis of the neoumbilicoplasty technique that selected the results of six patients who underwent abdominoplasty, previously classified in Group 5 of the Bozola & Psillakis Classification (abdomen with marked supra and infraumbilical excess skin, excess or not of adipose tissue and diastasis of the rectus abdominis and/or oblique muscles) [10]. The initial incision is supraumbilical, with detachment up to the xiphoid process. After checking for hemostasis, the umbilicus is isolated and the excess dermofat is removed from the abdomen in the infraumbilical region. The fabrication of the neonavel is initiated by placing 4 Kelly forceps in its quadrants.

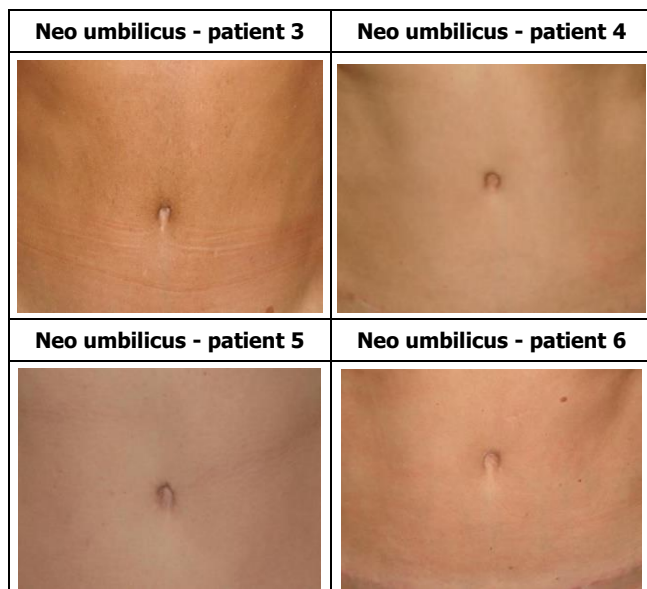
With the number 15 scalpel blade, the skin was incised at 12, 3, 6, and 9 hours, approximately 0.5 cm from the base of the umbilicus. After this maneuver, with the index finger of the contralateral hand, the skin was supported and the "arms" of the X were made, each about 0.5 cm long. After xiphoid-pubic plication of the rectus abdominis muscles, the new umbilicus was fixed to the aponeurosis at 12 and 6 hours, with monocryl 3.0. The skin where the new umbilicus was placed was incised in the shape of an X, for a perfect accommodation of the flaps, and sutured with 5.0 nylon. After that, the surgery was completed with suturing through the abdominal wall planes.

## Results

For the presentation of the technique of neoumbilicoplasty, samples from the navel region of six (6) patients who were previously submitted to abdominoplasty were used, and who were classified in Group 5 by Bozola & Psillakis [10]. It is noteworthy that this technique has already been performed in more than 2,500 patients by the plastic surgeon in the present study, and all cases were successfully performed. The presentation of the neoumbilicoplasty technique consisted of keeping a part of the native umbilicus, leaving the final scar with a hexagonal appearance, with a very low level of occurrence of hypertrophic scarring, providing a more natural and easy-to-perform result. **Figure 1** shows the skin where the new umbilicus was placed and it was incised in an X shape for perfect accommodation of the flaps and sutured with nylon 5.0. After that, the surgery was completed with suturing of the abdominal wall planes.

**Figure 1.** Presentation of the neoumbilicoplasty technique part of the native umbilicus, leaving the final scar with a hexagonal aspect. The skin where the neo umbilicus was placed was incised in an X shape for a perfect accommodation of the flaps.





### Systematic Review As Literary Support Study Design

The rules of the Systematic Review-PRISMA Platform (Transparent reporting of systematic reviews and meta-analysis-[HTTP://www.prisma-statement.org](http://www.prisma-statement.org)) were followed [11].

### Data Sources And Research Strategy

The search for this systematic review was based on the keywords (MeSH Terms): "*Plastic surgery strategies. Neoumbilicoplasty. Abdominoplasty. natural result*". The search was carried out from March 2022 to June 2022 in Scopus, PubMed, Science Direct, Scielo, and Google Scholar databases. In addition, the combination of keywords with the Booleans "OR", "AND" and the "NOT" operator were used to target scientific articles of interest.

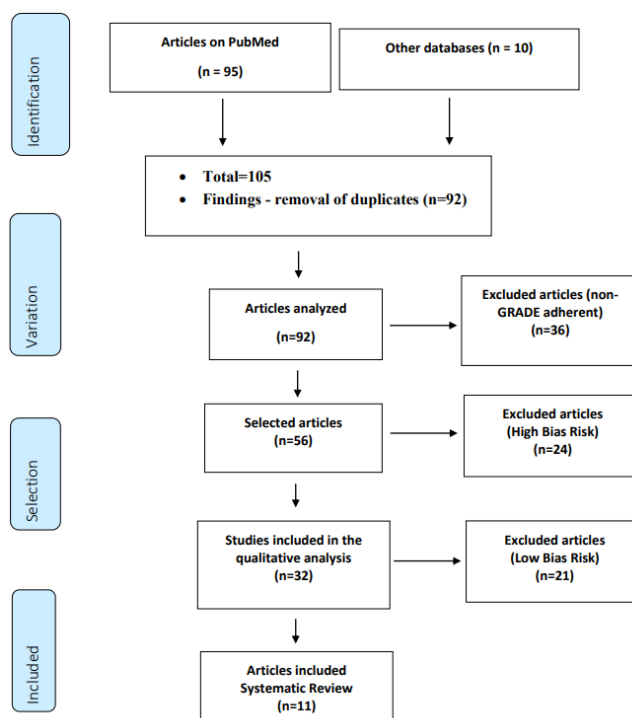
### Study Quality And Risk Of Bias

The quality of the studies was based on the GRADE instrument [12] and the risk of bias was analyzed according to the Cochrane instrument [13].

### Major Findings On The Neoumbilicoplasty and Discussion

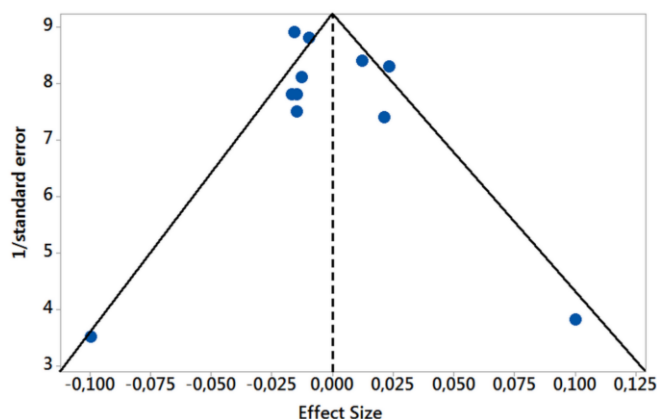
It was found 105 articles involving neoumbilicoplasty. Initially, article duplication was excluded. After this process, the abstracts were evaluated and a new exclusion was performed, removing the articles that did not include the topic of this article. A total of 32 articles were fully evaluated and 11 clinical studies were included and developed in the systematic review. A total of 36 studies did not meet the GRADE (**Figure 2**), and 24 studies were excluded because they had a high risk of bias. Considering the Cochrane tool for risk of bias, the overall assessment did not result in significant risk of bias studies (**Figure 3**).

**Figure 2.** Article selection (Systematic Review, N=11 clinical studies).



**Figure 3** presents the results of the risk of bias in the studies using the Funnel Plot (Effect Size - Cohen's Test). The sample size was determined indirectly by the inverse of the standard error (1/Standard Error). The graph showed symmetrical behavior, not suggesting a significant risk of bias in the studies with small sample sizes that are shown at the bottom of the graph.

**Figure 3.** The symmetrical Funnel Plot does not suggest a risk of bias between the small sample size studies that are shown at the bottom of the graph (N=11 clinical studies).



The presentation of the neoumbilicoplasty technique in the abdominoplasty scenario of the present study demonstrated the success of the

procedures in maintaining a part of the native umbilicus, with a final scar in a hexagonal aspect, and practically without the occurrence of hypertrophic scar, the eleven (11) main studies that used other neoumbilicoplasty techniques to compare with the results of this study, as well as to support the simple learning curve to achieve consistent and reproducible results in a wide variety of patients.

Among the studies analyzed, there was no risk of bias that could compromise the results presented (Figure 3), however, there is still no ideal technique for neoumbilicoplasty in abdominoplasty. Despite this, the present study is contributing to yet another advance in the quality and improvement of neoumbilicoplasty and patient satisfaction. Thus, the studies presented below describe the main techniques of neoumbilicoplasty that have been published, to express the State of the Art on this and compare them with the present technique of the present study.

Thus, one study presented a technique that offers an aesthetically pleasing navel, being small, and vertically oriented with a superior hood. The technique employs an inverted Vshaped umbilical and abdominal incision and removal of periumbilical fat. The umbilical incision is more like an inverted V than an inverted U, although the abdominal flap is an inverted U. It also kept the lower flap thicker, leaving some subcutaneous tissue instead of incising at the level of the deep dermis, helping to ensure the viability of this small flap and smoothing the transition from the lower abdominal skin to the umbilical groove. More extensive circumferential degreasing was also performed, approximately 1.5 cm superior and inferior and 0.5 cm lateral to the umbilical incisions. When attaching the navel to the fascia of the rectum, the 6 and 12 o'clock positions were preferred rather than just the 6 o'clock position. This allows a better definition of the umbilical sulcus and helps to hide the inferior scar making it less visible [14].

Also, a study developed by Silva Júnior et al. 2017, aimed to improve the technique of neoumbilicoplasty, creating a deeper and more natural-looking navel, and propose a reoperation technique for a shallow navel. This technique was used in 108 patients aged 25 to 67 years who underwent scarless abdominoplasty and neoumbilicoplasty under epidural anesthesia performed by the same surgeon and in the same hospital, with a follow-up of 6 to 24 months. The main objective was to create a properly located structure with a natural, youthful appearance and minimal scarring. Thus, we used ten (instead of six) fixation points and we mobilized the adipose tissue towards the center of the new umbilicus to obtain greater depth, even in thin patients. Scarless neoumbilicoplasty does

not require suture removal and poses no risk of umbilical dehiscence, secretion, or stenosis, as seen with other techniques. Therefore, the location of the new umbilicus in the space between the rectus abdominis muscles, the use of ten stitches instead of six, and the mobilization of adipose tissue towards the periumbilical region constitute an improvement of the neoumbilicoplasty technique [15].

In addition, one study reported a technique for umbilicoplasty based on an elliptical vertical incision of the umbilical skin and an opposing double "Y" incision in the abdominal flap to create a new umbilicus. A total of 111 abdominoplasties were performed, with a 5-year follow-up. For all patients, a three-dimensional navel with adequate depression was created. In four cases there was reepithelialization of the umbilical skin. After 1 year postoperatively, no significant changes in umbilical shape, dimension, depth, or appearance were observed. After 5 years, no significant changes in shape or appearance were observed. The occurrence of cicatricial umbilical stenosis was 4.5%. A small significant decrease in umbilical depth was noted [16].

Besides, a study carried out at the Saint-Louis Hospital in Paris evaluated the satisfaction of patients with abdominal dermolipectomy with transposition of the umbilicus. All patients were operated on according to the technique of detachment of the navel in V, reinsertion of the navel in "aile de mouette" (seagull wing), and periumbilical degreasing associated with plication of the umbilical stem. 96 patients were included. No patient had umbilical necrosis. The result of umbilical transposition was considered good to excellent for 92.7% of patients [17].

Also, the authors used a technique in 23 consecutive abdominoplasty procedures involving a stainless steel spherical device to definitively locate the new neo umbilicus site. Abdominoplasty was performed with complete muscle plication and umbilicoplasty with a technique that involves a stainless steel marble called the Umblicator. It has a diameter of 1.5 cm and three 2 mm holes drilled 120° apart in an equilateral triangle. The Umblicator is attached to the lower and upper dermis of the umbilical stalk to help identify the future location of the umbilicus on the abdominal skin. The result produced a definitive means of identifying and releasing the umbilical peduncle during abdominoplasty, without difficulties in locating the umbilical peduncle and without infections resulting from the procedure [18].

Moreover, an observational clinical study analyzed the surface anatomy of the umbilicus using an umbilicoplasty technique. A total of 23 patients with a mean age of 45.5 years underwent elective breast reconstruction with a free deep inferior epigastric



perforator flap. All 23 patients underwent Ace of Spade's divine proportion umbilicoplasty. The results showed nice-looking, depressed navels and top hooded ovals were successfully achieved. There was no infection or necrosis of the navel skin or abdominal skin flaps. In addition, there was no scar constriction, navel distortion, or stenosis. Postoperative results were excellent in 8 cases (36%), very good in 12 (55%), and good in 2 cases (9%) with slightly hypertrophic scars. Patient satisfaction was high to very high [19].

Added to this, the authors Kurt Yazar et al. 2019 [20] presented an umbilicoplasty technique involving the use of a three-armed star flap and compared it with the round technique. Forty-eight (48) female patients underwent umbilicoplasty during abdominoplasty and free deep inferior epigastric perforator flap, with a 22-month follow-up. Twenty patients underwent round umbilicoplasty, while the three-arm star flap technique was used in the remaining 28. The results showed that hypertrophic scarring was observed in one patient with the three-armed star flap technique and two patients with the round technique and scarring formation occurred in one patient with the round technique. Patient and surgeon questionnaire scores were significantly higher in the 3-arm star flap group. Patient satisfaction surveys and evaluations by two independent surgeons revealed better esthetic results with the new technique [20].

Besides, the authors Reho et al., 2019 [21] showed a technique to recreate a navel with a natural appearance, without visible scar and that is properly positioned. The technique was performed in 147 abdominoplasties of patients of both sexes (123 women and 24 men), with a mean age of 35 years and a mean BMI of 24 kg/m<sup>2</sup>. The procedure involves creating a reduced size, 10 × 5 mm belly button, and inserting it into the abdominal wall. Subsequently, the abdominal flap not yet sutured is extended caudally to determine the navel projection point. The abdominal skin is marked, the flap is reversed, and an internal suture is performed. The results showed an aesthetically pleasing, natural-looking navel with no visible scars, and in the correct position. In two years, the results remain stable. No major complications occurred [21].

A retrospective clinical study performed by Chung et al. 2021 [22] presented an inverted-U incisional technique for umbilicoplasty, describing the senior author's approach to umbilicoplasty and comparing the aesthetic results of the inverted-U method with those of the vertical oval incisional technique. A total of 109 patients were analyzed, including 51 submitted to umbilicoplasty with the inverted U-shaped incisional technique and 58 operated on by the vertical oval

incisional method. The esthetic results of both techniques were compared by two independent surgeons using a 5-point Likert scale in terms of shape, size, depth, natural appearance, and periumbilical scar. In all measured parameters, the inverted-U incisional technique produced favorable results compared to the vertical oval incisional technique. In addition, the inverted-U incisional technique received significantly higher total scores than the vertical oval incisional technique. Therefore, the inverted-U incisional technique produced significantly favorable results in terms of shape, size, depth, natural appearance, and overall score compared to a vertical oval incision [22].

A study prepared by the authors Kachare et al., 2019 [23] presented a method for placing an umbilical stent that creates a modest navel, avoiding stenosis. All patients underwent abdominoplasty with umbilical reconstruction using an inverted U flap. A total of 21 female patients were evaluated 6 weeks after surgery. In all cases, both the patient and the surgeon were 100% satisfied with the final size. Umbilical size ranged from 1.8 to 2.2 cm. Therefore, the use of an earplug for umbilical stent placement is a simple and reproducible method to create an aesthetically pleasing navel and prevent stenosis [23].

Finally, a recent observational clinical study developed by authors Graham and Livingston 2022 [24] investigated the shape and optimal location of the male umbilical. We examined 81 photographs of the main male models to assess different proportions based on anatomical points and umbilical appearance. The relationship between the distance from the xiphoid to the center of the umbilicus (XU) and the corresponding distance from the center of the umbilicus to the abdominal crease (UC) had the highest reliability (XU/UC ratio, with a mean measurement:  $1.68 \pm 0.38$ ), which placed the male navel in a similar position, but marginally below the average female navel, establishing that the ideal male navel differs from the female one [24].

## Conclusion

This study demonstrated the success of the procedures in maintaining a part of the native umbilicus, with a final scar in a hexagonal aspect, and practically without the occurrence of hypertrophic scar, contributing to yet another advance in the quality and improvement of neoumbilicoplasty and patient satisfaction. The studies analyzed with literary support did not present a risk of bias that could compromise the results presented, however, there is still no ideal and standardized technique for neoumbilicoplasty in abdominoplasty.

## Acknowledgement

Not applicable.

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Not applicable.

## Ethical Approval

This study followed the ethics committee's compliance and preserved the patient's anonymity, as well as preserving the rights and care of the patient and her information as recommended by the Declaration of Helsinki of 1964.

## Informed consent

Not applicable.

## Data sharing statement

No additional data are available.

## Conflict of interest

The authors declare no conflict of interest.

## Similarity check

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