Facilitated Umbilical Positioning in Abdominoplasty Using the 15/10 Rule and the “Flap Flipping” Technique

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Summary: First described by Gaudet and Morestin, abdominoplasty with umbilical preservation dates as far back as 1905. Navel position was described on the transverse axis by Rohrich, and on the median longitudinal axis, by Vernon, Baroudi and Pitanguy. The aim of this article is to validate the 15/10 rule of umbilical positioning in abdominoplasty with the “flap flipping” technique, as an intraoperative aid to simplify umbilical repositioning. Between October 2019 and March 2020, 18 consecutive patients underwent full abdominoplasty, using the 15/10 rule for umbilical positioning. Patients’ average age was 47.9, with body mass index 27.5 kg/m² and height 1.63 m. An “expected zone” of umbilical position was delineated by 2 horizontal lines, 15 cm from the bra line and 10 cm from the pubic level. The umbilicus was accurately positioned by using the flap flipping technique before closure of the inferior abdominal incision line. It was then examined to determine whether the umbilicus was situated in the expected zone. In 14 of 18 patients, intraoperative and postoperative measurements of umbilical position were in the expected zone. An average 15.19 cm was measured between the bra line and the new umbilical positioning, and 12.02 cm from the new umbilicus to the pubic inferior suture line. We find that the 15/10 rule of umbilical positioning with the flap flipping technique is an important, intuitive, and easy-to-use guide for precise umbilical positioning in abdominoplasty. (Plast Reconstr Surg Glob Open 2021;9:e3574; doi: 10.1097/GOX.0000000000003574; Published online 6 May 2021.)

INTRODUCTION

Umbilical transposition in abdominoplasty was first described by Vernon in 1957.1 Many efforts were made to define the correct position of the umbilicus both in abdominoplasty and in breast reconstruction procedures, utilizing the abdomen as a donor site. Navel horizontal position described by Rohrich, stated that umbilicus is rarely midline.2 Longitudinally, it was described by different authors as being 4 cm below the waistline, in a neutral position, and 3 cm above the anterior iliac crest.3,4 The xiphoid-umbilicus: umbilicus-abdominal crease ratio was found to be 1.62 ± 0.12.5 Several incision and flap types had been described to achieve a natural appearing umbilicus.6-12 Abundant techniques were described for the restoration of the umbilicus in its new position on the abdominal flap in classical abdominoplasties.13,14 The cosmesis of the new umbilicus affects the abdomen’s appearance and patient satisfaction with the procedure as a whole.15 Thus, a simple guide and technique for positioning the umbilicus would be much appreciated, especially by inexperienced surgeons performing abdominoplasties.

In this prospective analysis, we aimed to describe and validate the 15/10 rule for umbilical positioning in abdominoplasty with the “flap flipping” technique.
PATIENTS AND METHODS

The 15/10 rule for umbilical positioning is routinely used by the senior author and has been applied to hundreds of abdominoplasty cases. However, to evaluate the rate of “out of expected zone” cases, a prospective study was designed. The study group consisted of 18 consecutive abdominoplasty patients, between October 2019 and March 2020. Inclusion criteria were full abdominoplasty with classical anterior rectus sheath midline plication. Exclusion criteria included all other types of abdominoplasties: umbilical float, mini, circumferential, and the fleur-de-lis technique.

Operative Technique and Measurements

Bra anterior and pubic midlines were marked. Skin length between bra line and umbilicus and between pubic line and umbilicus were labeled SkinBU and SkinUP, respectively. Aerial distances were defined as the distance between the anteriorly projected plumblines emerging from these landmarks, as opposed to the skin length between them. The aerial distances were labeled AerialBU and AerialUP, respectively (Fig. 1).

Our standard abdominoplasty technique begins with lateral and upper abdominal liposuction, followed by umbilical release. Resection of the lower abdominal skin and fat is then performed, preserving the lateral subscarpal tissue (Subscarpal Lipo Aponeurotic System16). Epigastric midline dissection is continued up to the xiphoid and costal margins. Classical anterior rectus sheath midline plication is performed using 2 layers of polyglactin 910 (Vicryl suture #1), interrupted and continuous locking suture. Midline Vicryl #0 progressive tension sutures are placed down to the umbilicus, with the patient slightly in the folded position.17 Umbilical positioning with the aid of the 15/10 rule and the flap flipping technique is then performed. Following umbilical positioning, the umbilicus is telescoped and the abdominal flap is fixed with Vicryl 2-0 sutures at 12 and 6 points of the umbilicus. The umbilicus is sutured to the abdominal flap with half-buried horizontal mattress poliglecaprone 25 Monocryl 3-0 sutures. In biplanar lipoabdominoplasty15 the Subscarpal Lipo Aponeurotic System is sutured in the midline using Vicryl 2-0 continuous suture. Quilt Vicryl 2-0 progressive tension sutures are placed in the lower abdomen followed by closure of the lower incision line with 2 layers of continuous Vicryl 2-0 and 3-0 sutures. Upon the surgeon’s intraoperative decision, a Jackson-Pratt #10 drain is left in the subcutaneous space.

Intraoperatively, flap midline and horizontal markings were made: 15 cm caudal to bra line and 10 cm cephalad to pubic level, projected on the skin flap. The area between these lines was defined as the “expected zone” (Figs. 1, 2).

In our technique, the umbilicus is exteriorized before closure of the lower suture line. The flap flipping technique is performed by quickly elevating and lowering the abdominal flap to visualize the correct umbilical position on the new abdominal wall. This position is easily transposed and drawn on the abdominal flap, in a fashion similar to that of an animation flip-book. We would normally anticipate this point to be in the expected zone. (See Video [online], which displays the flap flipping technique.)

At the end of surgery, with the skin fully stretched, measurements of bra line to umbilical center and umbilical...
center to pubic line are performed and labeled BUcenter and UcenterP, respectively (Fig. 1).

We compared the preoperative, intraoperative expected zone and postoperative measurements. Pearson correlation and Mann Whitney U tests were used. \( P < 0.05 \) was considered significant.

**RESULTS**

Average age was 47.9 ± 6.6, average body mass index (BMI) was 27.5 ± 3.86, and average height was 1.63 ± 0.05 m; 14 patients were overweight or obese (Table 1).

Umbilical position was found to be in the expected zone in 14 of 18 patients. In all other 4 cases, the umbilicus position was above (cephalad to) the expected zone, with average distance of 1.75 cm (range 1–2.5 cm) from its upper border. No postoperative malposition of the umbilicus was noticed.

Summary of calculated correlations:

1. Positive linear correlation between AerialBU to SkinBU (\( R = 0.93, P < 0.0001 \)).
2. No significant correlation between Aerial UP to SkinUP (\( R = 0.44, P = 0.068 \)).
3. Positive linear correlation between postoperative BUcenter to preoperative SkinBU and AerialBU (\( R = 0.775, P < 0.0001 \) and \( R = 0.808, P < 0.0001 \), respectively).
4. Postoperative UcenterP is a relatively constant distance, with no correlation to patient BMI (\( R = 0.28, P = 0.91 \)).
5. The ratio between preoperative SkinBU and preoperative SkinUP was relatively constant (average ratio 0.97), with no correlation between this ratio and BMI (\( R = 0.029, P = 0.91 \)).
6. The average ratio between the postoperative BUcenter and the postoperative UcenterP was 1.27, with gradual increase as BMI rises (\( R = 0.509, P = 0.031 \)).

**DISCUSSION**

In our 15/10 rule of umbilical positioning with the flap flipping technique, we attempted to devise an easy-to-use, intuitive yet precisely measured technique for umbilical

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Table 1. Personal Data, Preoperative Skin, and Aerial Distance Measurements, Intraoperative Distance from Expected Zone, and Postoperative Distance Measurements

| Patient No. | Age (y) | Height (cm) | Weight (kg) | BMI (kg/m²) | AerialBU (cm) | SkinBU (cm) | AerialUP (cm) | SkinUP (cm) | In Expected Zone? | Distance from EZ (cm) | BUcenter (cm) | UcenterP (cm) |
|-------------|---------|-------------|-------------|-------------|---------------|-------------|---------------|-------------|------------------|----------------------|---------------|---------------|
| 1           | 39      | 158         | 72          | 28.9        | 25            | 25          | 12            | 24          | Yes              | 16.5                 | 16.5          | 10            |
| 2           | 39      | 155         | 64          | 26.3        | 21            | 23          | 12            | 25          | Yes              | 15.5                 | 15.5          | 10.5          |
| 3           | 52      | 163         | 60.2        | 22.7        | 14            | 17          | 14            | 20          | No               | 2.5                  | 12            | 12            |
| 4           | 47      | 167         | 58          | 20.8        | 18            | 19          | 11            | 17          | Yes              | 16.5                 | 16            | 14            |
| 5           | 46      | 168         | 77          | 27.3        | 16            | 18          | 19            | 26          | Yes              | 16.5                 | 16.5          | 11.5          |
| 6           | 43      | 165         | 82          | 30.1        | 24            | 28          | 15            | 25          | Yes              | 16.5                 | 16.5          | 12            |
| 7           | 46      | 156         | 71.5        | 29.4        | 19            | 22          | 16            | 25          | Yes              | 16.5                 | 16.5          | 14            |
| 8           | 50      | 162         | 74.5        | 28.4        | 19            | 22          | 15            | 21          | Yes              | 16.5                 | 16.5          | 11.5          |
| 9           | 43      | 167         | 64.5        | 23.2        | 15            | 20          | 15            | 22          | No               | 1.5                  | 14            | 11.5          |
| 10          | 44      | 168         | 79          | 28          | 15            | 18          | 19            | 22          | Yes              | 14.5                 | 14.5          | 12.5          |
| 11          | 49      | 156         | 36.6        | 24.5        | 16.5          | 19.5        | 15            | 20          | Yes              | 15                   | 15            | 12            |
| 12          | 48      | 160         | 66.5        | 25.9        | 16            | 19          | 14            | 19          | Yes              | 15                   | 15            | 13            |
| 13          | 49      | 164         | 70.4        | 26.2        | 20            | 23          | 14            | 23          | Yes              | 17                   | 17            | 12            |
| 14          | 62      | 167         | 93.6        | 33.6        | 22            | 23          | 18            | 31          | Yes              | 16.5                 | 16.5          | 13.5          |
| 15          | 61      | 167         | 69.9        | 25.1        | 22            | 23          | 14            | 20          | Yes              | 10.5                 | 10.5          | 15.5          |
| 16          | 57      | 163         | 77.6        | 29.2        | 21            | 24          | 15            | 19          | Yes              | 16                   | 18            | 12.5          |
| 17          | 46      | 172         | 85          | 28.7        | 19            | 23          | 14            | 26          | Yes              | 17                   | 17            | 11.5          |
| 18          | 42      | 158         | 92.4        | 37.1        | 25            | 26          | 15            | 23          | Yes              | 17                   | 17            | 11.5          |
positioning. This technique helps guide optimal umbilical positioning on the vertical axis of the abdominal wall, taking into account, by its mere creation, the height and weight differences in full abdominoplasty patients.

The 15/10 rule delineates the expected zone, which is an intraoperative guide to umbilical positioning (Figs. 1B, 2B). It is a rule of fixed measurements that determines a variably sized, expected zone that takes into account the body’s individual dimensions, being longer in taller individuals. In extremely short torsos, it is formed by the overlap between the fixed measurements.

The flap flipping technique (See Video [online]) is an intraoperative key element used to confirm the umbilical’s final position, which in most patients is in the expected zone. Four of the patients exhibited umbilical position cephalad to the expected zone. Univariate analysis revealed 3 independent variables that predict this location: BMI, SkinBU, and AerialBU (Table 2: \( P = 0.015, 0.014, 0.013 \) respectively). Thus, lower BMI and shorter BU distances can alert the surgeon to expect that the umbilicus will be positioned higher than the expected zone.

The flap flipping technique can be performed only before the closure of the lower abdominal incisional line. This is an unfamiliar surgical path but it has great advantages. The upper abdominal skin tension is well controlled. There is greater ease in setting the upper abdominal midline suture. The exact position of the umbilicus is controllable and can be “fine-tuned.” And finally, there is surgical accessibility to the umbilical stalk, after setting the umbilicus, while the exact point of positioning is dictated by the flap flipping technique.

A few more conclusions can be drawn from our study data. The upper abdominal skin length correlates to the upper abdominal aerial length, and is less variable than the lower abdominal skin length. As expected, the SkinBU and AerialBU distances correlate significantly to the postoperative BUcenter distance. By contrast, the lower abdominal skin length measurements (SkinUP, AerialUP, and UcenterP) do not correlate, and with change of BMI, UcenterP, distance is relatively constant. Thus, upper abdominal measurements better predict the postoperative umbilical position. Postoperative upper abdominal distance correlates to the rise in BMI, and the ratio between BUcenter/UcenterP grows as the BMI rises. This again emphasized that the preoperative AerialBU is the better umbilical position predictor for different BMI patients, and low BMI is a positive predictor of cephalad out of expected zone umbilicus; with average BMI of 23.5, compared with an average BMI of 28.6 in those in the expected zone (Table 2).

## CONCLUSION

The 15/10 rule of umbilical positioning in abdominoplasty, together with the flap flipping technique is intuitive, easy-to-use, and enables the surgeon to accurately position the umbilicus in abdominoplasties.

### Table 2. In Expected Zone versus Out of Expected Zone Comparison

|                | Out of Expected Zone (n=4) | In Expected Zone (n = 14) | \( P \) |
|----------------|---------------------------|--------------------------|--------|
| Age (y)        | 47.0 ± 3.7                | 48.2 ± 2.3               | 0.96   |
| BMI (kg/m²)    | 23.5 ± 2.7                | 28.6 ± 3.4               | 0.015  |
| AerialBU (cm)  | 15.7 ± 1.70               | 20.3 ± 3.2               | 0.014  |
| SkinBU (cm)    | 18.5 ± 1.3                | 22.75 ± 2.68             | 0.013  |
| AerialUP (cm)  | 14.75 ± 3.30              | 14.86 ± 1.92             | 0.83   |
| SkinUP (cm)    | 21.25 ± 3.77              | 23.07 ± 3.29             | 0.45   |

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This article does not contain any studies with human participants or animals performed by any of the authors.

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