

# Umblicoplasty: An Important Step in Abdominoplasty Surgery for Massive Weight Loss Cases

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## Abstract

**Aim:** Excessive increase of weight followed by massive weight loss distorts the shape of the umbilicus as part of the affected skin of the abdomen. There is usually discrepancy between the elongated umbilicus at the time the patient was gaining excessive weight and the thinned abdominal wall after the massive weight loss. This study discusses a procedure that aims at restoring the shape of the umbilicus to its original shape as much as possible. Patients and **Methods:** In 4 years retrospective study from the 1st of March 2016 till the end of February 2020, the files of the patients who underwent abdominoplasty after massive weight loss with umblicoplasty performed, as part of the procedure, were reviewed. In these patients the caudal part of the umbilicus at 6 o'clock site was excised in an oblique direction with slanting cut going to both 3 and 9 o'clock directions to shorten the elongated umbilicus keeping the cephalic part at 12 o'clock intact. This residual elongated cephalic part was utilized to make the shape of the hood of the umbilicus. A bolster suture was used at 12 o'clock to add a small depression above the hood. This technique gave the umbilicus the vertical "T" triangular shape with hooding. A questionnaire to assess patients' satisfaction regarding the shape, depth, location, size, scarring and overall result of the umblicoplasty procedure was conducted. The questionnaire used a five-point Likert-type scale as follows: 1 (poor), 2 (fair), 3 (good), 4 (very good), and 5 (excellent). Results were collected and evaluated. **Results:** 197 patients underwent full abdominoplasty surgery during this 4 years study. Those who underwent umblicoplasty during the abdominoplasty procedure were 34 patients. The results of the questionnaire could be obtained from 23 patients of them. Each patient gave a number from 1 - 5 for each aspect of the questionnaire of the umbilicus shape, depth, location, size, scarring and overall result. This resulted in total

number of points of 115 for each aspect (23 patients  $\times$  5 points). The patients' satisfaction with the shape of the umbilicus was 78.3% (90 out of the 115 points), 80.9% satisfaction rate with the depth (93 out of 115), 98.3% with the location (113 out of 115), 89.6% with the size (103 out of 115), 82.6% with the scar (95 out of 115) and 86.1% as an overall result (99 out of 115). **Conclusion:** Shortening of the elongated umbilicus at its caudal part with slanting incision directing to its cephalic part gives it the preferred vertical triangular "T" shape. Utilizing the length of the cephalic part in making the hood of the umbilicus and using a bolster suture to make a depression above the hood adds a shape near to the original natural one. The patients' satisfaction ranged from "very good" to "excellent" according to the five-point Likert-type scale.

## Keywords

Umblicoplasty, Hooding, Abdominoplasty, Massive Weight Loss

## 1. Introduction

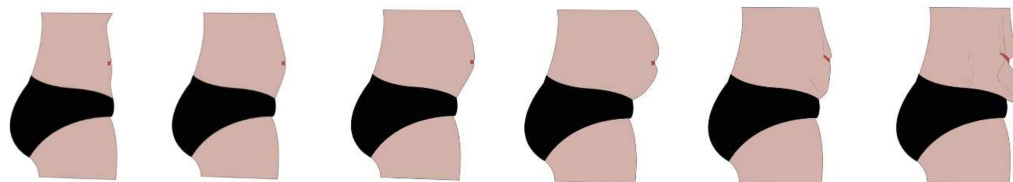
The umbilicus is the only normal scar on the body and it is the most noticeable scar following abdominoplasty [1].

It is described as a depressed scar surrounded by a natural skin fold that measures 1.5 to 2 cm in diameter and lies anatomically within the midline at the level of the superior iliac crests [2] [3].

When the patient gains weight, the umbilicus as the rest of the abdominal wall becomes surrounded by excess fat. Its skin stretches forwards with the protrusion of the abdomen of the patient. The umbilical stalk becomes elongated with time as the deposition of the subcutaneous fat continues (Figure 1).

After bariatric surgery or with diet and exercises, the patient starts to lose weight with loss of fat around the umbilicus as part of the rest of the abdomen. The previously stretched umbilicus faces downwards by gravity with more loss of weight. The sagging down of the surrounding skin around the umbilicus gives it the "Sad Face" appearance (Figure 2).

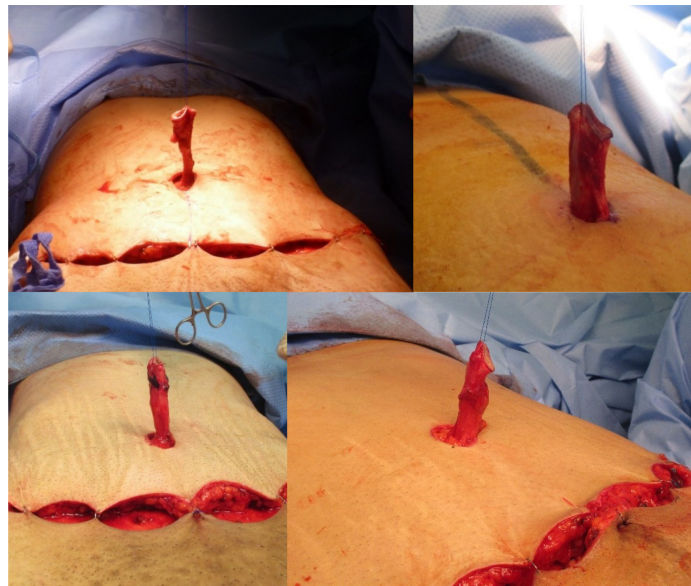
This results in much discrepancy in length in these patients between the elongated umbilical stalk and the thinned skin of the abdominal wall around it (Figure 3). Trying to suture the umbilicus to the surrounding skin in its new location during abdominoplasty procedures as it is, without shortening it, will cause



**Figure 1.** Changes which happen in the skin of the abdominal wall by increasing weight followed by excessive weight loss.



**Figure 2.** The “Sad Face” appearance of the umbilicus after excessive weight loss.



**Figure 3.** Length discrepancy between the elongated umbilical stalk and the thinned skin of the abdominal wall around it. Four different cases.

eversion and protrusion of the umbilicus with other misshape forms (**Figure 4**).

Our aim is to return the umbilicus close to its original ideal shape as much as possible.

The ideal shape of the umbilicus has been a matter of debate.

On their search for the ideal shape of the umbilicus, Craig, *et al.* did a panel photographic analysis of 147 female patients and found that the “T”—or vertically shaped umbilicus with superior hooding had the highest score in the aesthetic appearance [4]. Some of the studies called the “T” shape of the umbilicus as the triangular shape and reported high patients’ satisfaction with it [5] [6]. We



**Figure 4.** Protrusion and eversion of the elongated umbilicus when sutured without shortening to the surrounding skin.

tried to give the umbilicus that shape as much as possible. This study discusses the procedure done to achieve that goal (**Figure 5**).

## 2. Patients and Methods

This is a 4 years retrospective study from the 1st of March 2016 till the end of February 2020. During this period, the files of the patients who had abdominoplasty surgery for massive weight loss, either post bariatric surgery or post diet and exercises, were reviewed. The patients who underwent umbilicoplasty as part of the abdominoplasty procedures in these patients were included in the study. Pre- and post-operative photographs were evaluated. A questionnaire for the patients who had at least 6 months passed after the surgery was conducted to assess their satisfaction with the results of the umbilicoplasty procedure.

The patients were asked, either during their OPD follow up or through the phone, to evaluate and rate their new umbilicus in terms of shape, depth, location, size, scarring and the overall result.

Patients' satisfaction with the results of the surgery were rated using a five-point Likert-type scale as follows: 1 (poor), 2 (fair), 3 (good), 4 (very good), and 5 (excellent).

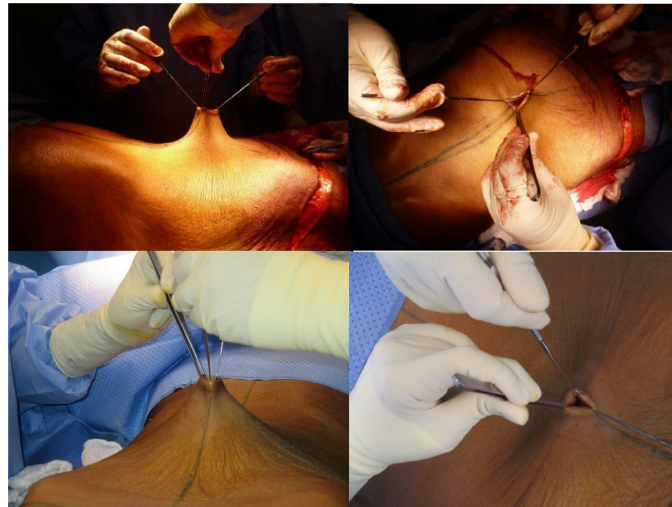
Percentages of each of these items were calculated to assess the patients' satisfaction with the performed procedure (**Appendix 1**).

### 2.1. The Performed Procedure

All the procedures are done under the effect of general anaesthesia with the patient lying in the supine position. An incision is made from a midline point 7 cm cephalic to the vulvar commissure in females or the root of the penis in males and extends laterally in a concave line on each side as much as required for removal of the sagging skin. The wound is deepened using the monopolar diathermy till the fascia superficialis and the anterior rectus sheath preserving the overlying thin lymphatic tissue layer. The dissection is continued in a cephalic direction to the umbilicus. Skin hooks are used to elevate the umbilicus up from the table and a forceps is inserted inside it to measure its depths. Usually, the umbilicus in massive weight loss cases takes the shape of a "Volcano" when lifted up due to its elongation and the thinning of the surrounding skin (**Figure 6**). The umbilical stalk is preserved. Dissection is continued circumferentially



**Figure 5.** Cases of the “T” shaped umbilicus with superior hood and small depression above it.



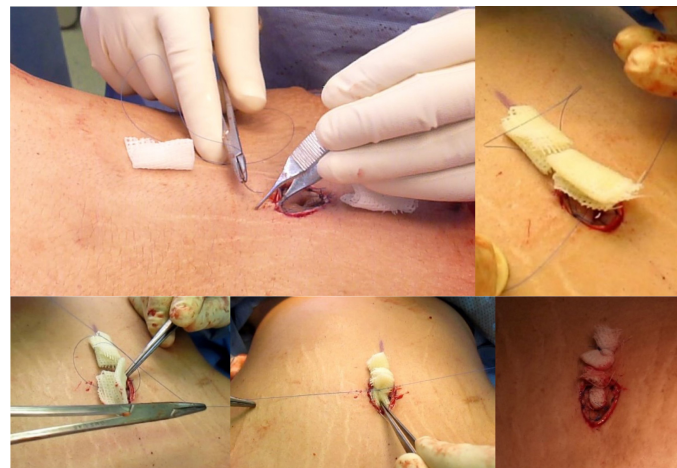
**Figure 6.** Two different cases showing the “Volcano” shape of the elongated umbilicus when pulled up from the surrounding thinned skin. Views from the side and top of the “Volcano”.

around the umbilicus from the elevated abdominal flap. From this level, the dissection is continued in about 10 cm width in the midline region in the cephalic direction till the xiphisternum.

If there is muscular diastasis, repair of the recti muscles is done in 2 layers using non absorbable sutures. The lower part of the skin flap is excised. Haemostasis is ensured. The umbilicus is extruded through the advanced overlying skin. If the umbilicus is much elongated compared to the surrounding skin and has more lumen depth in relation to its deeper fibrous umbilical stalk part, umbilicoplasty is done. The caudal part of the umbilicus is excised at 6 o’clock site in an oblique direction with slanting cut going to both 3 and 9 o’clock directions. This decreases the length of the umbilicus at its caudal part while keeping the length of the umbilicus in its cephalic direction at 12 o’clock intact without excising part of it. The excised part takes the shape of a “moustache” (**Figure 7**). A bolster stitch is passed from the skin of the abdomen at the 12 o’clock position to the umbilicus and back to the skin of the abdomen. It is tied over two pieces of Vaseline gauze; one kept at 12 o’clock of the umbilicus and one opposite to it on the abdominal skin. When this bolster suture is tied, it pulls the cephalic part of the umbilicus at 12 o’clock position under the skin of the abdominal flap making the umbilical hood shape. The slight depression above the hood can be performed by removal of small part of the fat from this area of the abdominal flap (**Figure 8**). The umbilicus is sutured to the rest of the surrounding skin with half



**Figure 7.** Excision of the caudal part of the elongated umbilicus at 6 o'clock in a slanting direction till 12 o'clock. The excised part usually takes the shape of a "moustache".



**Figure 8.** Bolster suture applied at 12 o'clock on the abdominal skin, passed at the cephalic part of the umbilicus and back again to the abdominal skin. The suture is tied on 2 pieces of Vaseline gauze; one kept at the cephalic part of the umbilicus and one opposite to it at the abdominal skin.

horizontal mattress non absorbable sutures. The Scarpa's fascia is repaired with 2/0 inverted absorbable sutures. The skin is sutured in two layers using 3/0 absorbable inverted interrupted dermal sutures and continuous subcuticular absorbable sutures. The wound is drained using two negative pressure drains; one kept at the epigastric region and the other one at the lower part of the wound. Dressing is applied with overlying compressive garment.

## 2.2. Postoperative Care

The patient is kept postoperatively in the bed in the modified Fowler's position. Mobilization is started on the first postoperative day. Subcutaneous low molecular weight heparin 40 mg is started 6 hours postoperatively and continued once daily for 7 days. Antithrombotic pneumatic compression stockings are started in the operation theatre and continued till the patient is discharged. The drains are kept on negative pressure and removed when the drainage is less than 20 ml of fluid in 24 hours for each drain. The patient is usually discharged by the fifth postoperative day. The bolster suture and the rest of the umbilical sutures are

removed after 2 weeks. The patient continues to wear the abdominal pressure garment after the abdominoplasty surgery for a period of one month. If plication of the recti muscles is done during the abdominoplasty procedure, the duration of the pressure garment is extended to 3 months postoperatively (**Figure 9** & **Figure 10**).

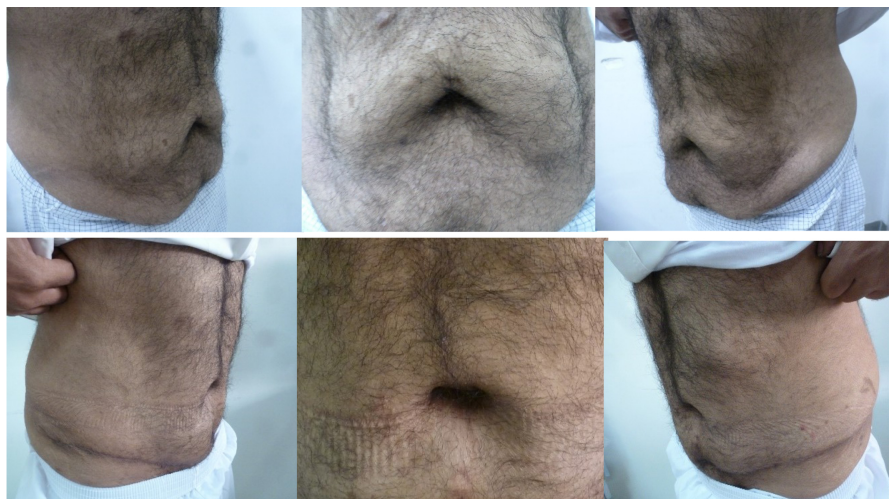
### 3. Results

During this 4 years study period 197 patients underwent full abdominoplasty surgery with dissection around the umbilicus.

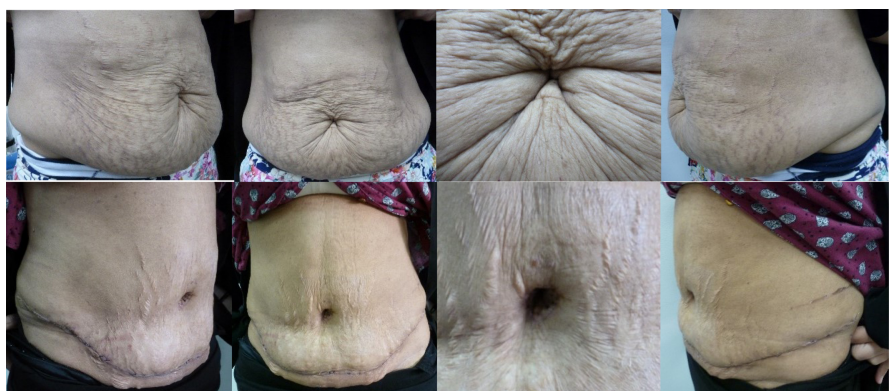
Out of these 197 cases of full abdominoplasty surgery, 120 patients were cases of massive weight loss; 118 of them by undergoing previous bariatric surgery and the other 2 by diet and exercises.

Out of the 120 patients of massive weight loss, 34 patients had umbilicoplasty done during their abdominoplasty surgery; 32 of them had previous bariatric surgery while the other 2 patients had weight loss by diet and exercise.

The 34 patients who underwent umbilicoplasty during their abdominoplasty surgery were 15 females and 19 males. The mean age was 34.3 years (22 - 55 y).



**Figure 9.** Pre- and post-operative photos of a male patient.



**Figure 10.** Pre- and post-operative photos of a female patient.

As plication of the rectus abdominus muscles in two layers shortens the length of the umbilical stalk, so umbilicoplasty was performed in combination with plication of the recti muscles in only three patients. The other 31 patients had umbilicoplasty done without plication of the recti muscles during their abdominoplasty surgery.

One of the patients who underwent umbilicoplasty as part of his abdominoplasty operation developed postoperative haematoma next day of the surgery. Evacuation of the haematoma was done with resuturing of the umbilicus as it was in the previous surgery. No patients developed seroma, wound infection, necrosis of the umbilicus or other complications.

A questionnaire about the umbilicoplasty procedure was conducted for those who had at least 6 months passed after the surgery. 23 cases of the 34 patients were able to fill the questionnaire form. The other 11 patients could not be contacted with loss of their follow up. The mean follow up period was 715 days (181 - 1356 days).

Each patient had to give points from 1 - 5 according to his/her satisfaction with the results of the umbilicoplasty surgery using a five-point Likert-type scale as follows: 1 (poor), 2 (fair), 3 (good), 4 (very good), and 5 (excellent). For the 23 patients, this created 115 score points for each of the categories of shape, depth, location, size, scarring and overall result.

The patients gave 78.3% satisfaction rate about the shape of the umbilicus (90 out of the 115 points), 80.9% for the depth (93 out of 115), 98.3% for the location (113 out of 115), 89.6% for the size (103 out of 115), 82.6% for the scar (95 out of 115) and 86.1% as an overall result (99 out of 115) (**Table 1**).

Considering the gender, the males had 80% satisfaction rate about the shape of the umbilicus (52 out of the 65 points), 76.9% for the depth (50 out of 65), 96.9% for the location (63 out of 65), 93.8% for the size (61 out of 65), 76.9% for the scar (50 out of 65) and 83.1% as an overall result (54 out of 65).

On the other hand, the females had 76% satisfaction rate about the shape of the umbilicus (38 out of the 50 points), 86% for the depth (43 out of 50), 100% for the location (50 out of 50), 84% for the size (42 out of 50), 90% for the scar (45 out of 50) and 90% as an overall result (45 out of 50).

**Table 1.** The patients satisfaction rates; gender related and total.

	Males 13		Females 10		Total 23	
	Points 65	Percentage	Points 50	Percentage	Points 115	Percentage
Shape	52	80%	38	76%	90	78.3%
Depth	50	76.9%	43	86%	93	80.9%
Location	63	96.9%	50	100%	113	98.3%
Size	61	93.8%	42	84%	103	89.6%
Scar	50	76.9%	45	90%	95	82.6%
Overall	54	83.1%	45	90%	99	86.1%



## 4. Discussion

The umbilicus is essential to the aesthetic appearance of the abdomen. Although it has no function after birth most of the people are concerned about its shape.

The umbilicus is classified into three main types; vertical, round or transverse. There is a variety of umbilical shapes encountered in the literature, including crescent, round, triangular, and oval (vertical, transverse, or oblique). In the adult the depressed umbilicus is far more frequent than the elevated or button-shaped type. The button-shaped umbilicus is an infantile form. A large umbilicus of the horizontal type is usually associated with a wide linea alba and diastasis of the recti abdominis muscles. Obesity has a tendency to produce the funnel-shaped umbilicus [7].

Many studies discussed the most preferred shape of the umbilicus.

Craig, *et al.* tried to assess the aesthetic appeal of differing types of the female umbilicus. A total of 147 photographs were categorized by the authors and then scored by a panel of 21 (predominantly male) examiners. A T-shaped umbilicus was the most prevalent and also scored highest on aesthetic appeal. The presence of hooding was shown to increase the score, whereas a protruding, large, or distorted umbilicus scored lower [4]. Cavale and Butler tried to assess the result reached by Craig *et al.* by conducting a Web site survey depicting color photographs of five female umbilical shapes. They received 251 responses (84 male and 167 female participants). The hooded oval (T-shaped) umbilicus was overwhelmingly preferred by both male and female participants. The second most popular choice among male participants was the horizontal shape [8]. The oval horizontal shape of the umbilicus in male patients was also considered to be the ideal umbilical shape in males by examining 81 photographs of top male models by Graham and Livingston [9]. In our study we chose the vertical T-shaped triangular umbilicus and we found that the satisfaction with it in males was 80% and in females 76%.

To give the umbilicus the triangular “T” shape, many procedures were prescribed. While Yazar, *et al.* used the key and hole pattern flap [10], Aboueldahab used a superiorly based triangular flap from the abdominal skin which was sutured to the umbilicus after slitting it at 12 o’clock to accommodate the flap [11]. The same principal was prescribed by Ramirez O.M. who used either superiorly or inferiorly based flaps [12].

These procedures had good results but did not give the umbilicus the proper hood shape with the area of depression above the hood. Removal of the sutures of the “V” shaped triangular flap inside the depth of the umbilicus can be another issue in the postoperative period.

In our procedure, a “V” shaped triangle was excised from the caudal part of the umbilicus shortening it and keeping all the sutures at the superficial skin level with easy removal in the postoperative period and at the same time preserving the hood of the umbilicus at its cephalic part with the small depression above through the bolster suture.

Bruekers, *et al.* shortened the umbilicus circumferentially leaving a stalk with a small (0.5 cm wide) epithelialized part of the umbilicus [13]. It resulted in decrease of the depth and size of the umbilicus. In our study the only part which was shortened was the caudal part of the umbilicus but the cephalic part was not excised and was utilized to make the hood of the umbilicus. This maintained the depth of the umbilicus and its size. The patients' satisfaction with the depth of the umbilicus was 80.9% and with the size of the umbilicus was 89.6%. Reducing the width of the umbilicus to 0.5 cm as performed by Bruekers, *et al.* can increase the hazard of its stenosis or even complete obstruction if the patient has liability for hypertrophic scar or keloid formation. In our study the patients' satisfaction with the scar was 82.6%.

On their study to determine the best exact location of the aesthetically pleasing umbilicus Abhyankar S.V., *et al.* evaluated 75 cosmopolitan female volunteers in the supine position. They found that the best location of the umbilicus is situated around the midline plane such that the ratio of the distance between the xiphisternum and the umbilicus and the distance between the pubic symphysis and the umbilicus is 1.6:1; also, the ratio of the distance between the umbilicus and anterior superior iliac spine and the inter-anterior superior iliac spine is approximately 0.6:1 [14]. In our study the patients' satisfaction with the location of the umbilicus was 98.3%.

## 5. Limitation of the Study

Further studies need to be conducted on a bigger number of patients to have a more appropriate assessment of their satisfaction with the results of their umbilicus in abdominoplasty surgery.

## 6. Conclusion

Our results show that shortening the elongated umbilicus at its caudal part in a slanting direction to the cephalic part and giving it a vertical "T" triangular shape reduces the discrepancy between the elongated umbilicus and its surrounding thinned abdominal wall skin. The residual elongated skin at the cephalic part of the umbilicus can be used to form the hood of the umbilicus. Keeping a bolster suture above the hood, after slight defatting of the abdominal flap, makes a small depression above the hood and gives it a shape near to its original normal shape. The patients' satisfaction with the result of this technique ranged from "very good" to "excellent" according to the five-point Likert-type scale.

## Compliance with Ethical Standards

This study was approved by Abu Dhabi Region Ethics and research Committee, Zayed Military Hospital Abu Dhabi. Reference No. 2023.10.

Surgical consent was obtained from all the patients before surgery. Consents for photography and publication were also signed by all the patients.

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## Competing Interests

The authors have no relevant financial or non-financial interests to disclose.

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## Appendix

Name: \_\_\_\_\_ Medical Records No.: \_\_\_\_\_

Age: \_\_\_\_\_ Sex: \_\_\_\_\_

Please evaluate the rate of your satisfaction with the result of your umbilicus in terms of shape, depth, location, size, scarring and the overall result by ticking in the appropriate box of a number from 1 - 5 for each of these items as follows: 1 (poor), 2 (fair), 3 (good), 4 (very good), and 5 (excellent).

### Appendix 1. Questionnaire of Patient's satisfaction with the umbilicus result.

Item	1 (Poor)	2 (Fair)	3 (Good)	4 (Very Good)	5 (Excellent)
Shape					
Depth					
Location					
Size					
Scar					
Overall					