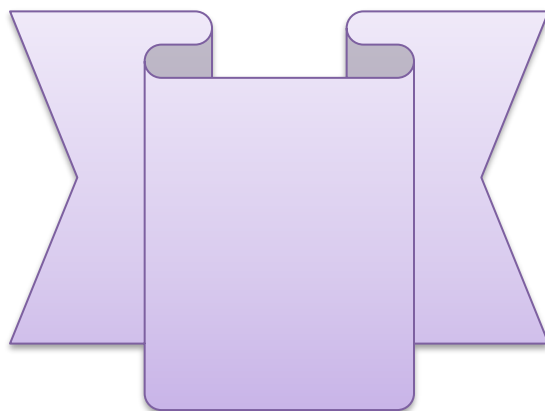


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Original Article

Circumferential Abdominoplasty after Massive Weight Loss Following Bariatric Surgery

Shehab Mohamed Yousif *, Yasser Ahmed Amer, Mohammed Hassan Elshafey

Department of General Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.

ABSTRACT

Article information

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*Corresponding author

Email: dsmy707@gmail.com

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Background: Following a massive loss of weight of obese patients, the excess skin folds and body contour is disturbed so, abdominoplasty is recommended to restore the normal body contour and shape.

Aim of the Work: This study aimed to evaluate circumferential abdominoplasty with regard to the outcome and complications.

Patients and Methods: This prospective cohort study was conducted on 30 patients aged >18 years old, both sexes who had a relative stable body weight for at least 12 months after the bariatric surgery recommended for circular abdominoplasty. All steps of surgical procedures were explained to the participants. Patients were followed up for presence of complications and satisfaction rate were done at 2 weeks, 6 weeks, 3 months and 6 months.

Results: The mean age was 39.2 ± 10.2 and the majority were females 21 [70%]. The mean resected weight from abdomen during abdominoplasty among the studied patients was 4.3 ± 0.7 Kg. The intraoperative time was 265 ± 21 minutes while the blood loss was 426.9 ± 195.7 ml. The mean satisfaction rate among patients towards the abdomen during abdominoplasty was 94.5 ± 4.5 . The mean hospital length of stay was 4.7 ± 1 day. The most prevalent post abdominoplasty complication was wound dehiscence 2 [6.7%] then seroma 2 [6.7%], hypertrophic scar 1 [3.3%] and local hypoesthesia 2 [6.7%]. there was a significant association between the occurrence of complications and lower satisfaction, longer duration of hospital stay and older age of participants.

Conclusion: Circumferential abdominoplasty provides a higher satisfaction rate from patients with minimal rates of complications. Therefore, this procedure could be safely applied to patients with massive loss of weight.

Keywords: Circumferential; Abdominoplasty; Belt lipectomy; Bariatric surgery.



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INTRODUCTION

Obesity is considered a major public health issue worldwide that is usually associated high morbidity and mortality. The condition is not associated with physical issues like dyslipidemia, DM and cardiovascular disorders only but also psychological, economic, and social effects ^[1].

One of the main methods to achieve weight loss is the bariatric surgeries. These procedures also decrease the prevalence of the associated risk factors like DM, dyslipidemia and help in reducing total mortality ^[2].

The success of these procedures is associated usually with undesirable elements like the loose and redundancy of the skin especially at the abdomen, thighs, upper arms, chest and the back. This loose skin may lead to discomfort and recurrent infections in addition to social inhibition ^[3]. This is the rule of body contouring surgery to eliminate the discomfort caused by excess redundant skin. Abdominoplasty, lower and upper body lift, brachioplasty, and thigh lift are the most common surgical approaches for treating this condition ^[4].

Quality of life is often questioned both within the bariatric context and in cosmetic surgery, especially in women ^[2]. An abdominoplasty is usually mandatory for such patients. This desired goal of this surgical procedure is to reduce the redundancy of fat and skin, to recreate the competence of the abdominal wall and to correct pubic ptosis and reshape the mons pubis. Abdominoplasties are classified according to the type of incision used: Transverse, vertical, or combined ^[3].

The post-massive-weight-loss body contouring surgery is not free of risks. It is often necessary with long incisions in the skin, which is not of the best quality, and the patients typically have other comorbidities. The most frequent observed complications are: hematoma, infection, seroma, wound dehiscence, necrosis, asymmetry, lymphoedema, unsightly scarring, influenced sensibility/ neuropathy and deep venous thrombosis [DVT].

To the best of our knowledge, there is limited studies that evaluate the aesthetic outcome and patients' satisfaction in addition to the postoperative complications.

The goal of our study was evaluation of circumferential abdominoplasty as regards to the aesthetic outcome and patients' satisfaction following the surgery in addition to the postoperative complications.

PATIENTS AND METHODS

This prospective cohort study was conducted on 30 patients aged >18 years old, both sexes who had a relative stable body weight for at least 12 months after the bariatric surgery recommended for circular abdominoplasty at Al-Azhar University Hospitals, Cairo, Egypt during the period between 1/9/2021 till 1/10/2022. The study was approved by the local ethical committee. An informed written consent was assigned before recruitment in the study. We excluded patients with age < 18 years, presence of chronic illness like DM, HTN, CVS diseases and pregnancy.

In the present study, we performed these methods to assess the effect of different techniques of abdominoplasty post weight loss and post bariatric patients to enhance the results and achieve more cosmetic contouring with less complications.

All patients were subjected to full history taking, general examination and laboratory investigation.

Preoperative markings

Preoperatively, markings were done in upright position and the assistant surgeon was asked to lift the redundant skin. The first mark was done on the back first starting from the natal cleft at its upper limit considering the different length of buttocks. The effect of liposuction was kept in mind during the markings to expect the scar position.

The first line was made at the mid-scapular line to meet the convexity of the lower marks. The lateral down line was designed meeting the cellulite. The target was to end in a seagull wing scar to be concealed with the undergarments.

The patient was then turned, and the right side of tissues were pulled up by the assistant and a line was drawn as a continuation from the markings on the back to in a curved manner to reach the level of symphysis pubis. The left side was managed in the same manner.

The vertical lines extend in the midaxillary lines and the midline. The horizontal lines were drawn anteriorly about 7 cm above the base of the penis in males or the vulvar commissure in females. The lines were then continued in a curvilinear manner to reach the level of anterior superior iliac spines. Temporary drawing of the superior excision line was extended to the umbilicus or just above it and is accurately identified at the surgery following superior undermining. Markings of the buttocks and the back were drawn depending on the pinch test. The resection of the skin in the back is essential to be conservative due to the fixed skin in this area.

Surgical technique

The surgical procedure was done under general anesthesia in a prone position. Disinfection was done and to achieve a better hemostasis, infiltration of the incisional area was done by epinephrine diluted with saline solution [1 mg epinephrine was added to 500 ml saline].

Using a scalpel, the skin and fat were resected starting from the midline and directed laterally till the iliac crests according to the preoperative markings leaving thin layer of fat over the deep fascia. In case of a small gluteal volume, the fat was preserved for gluteal augmentation.

Wound closure was done in three layers using absorbable sutures for the fascia and the sub-dermal [0 and 2/0], respectively. 3-0 non-absorbable sutures were used to stitch the subcutaneous skin. The lateral parts were sutured with stay sutures. A temporary dressing was applied and will be changed at the end of the surgery. After insertion of the drain on the back, repositioning of the patient was done on trolley to be turned into a supine position followed by transferring to the operating table and disinfection and draping of the surgical field.

Starting with liposuction, tumescent infiltration was performed. The stay sutures temporarily closing the lateral sides were removed once the liposuction was complete. We started with the anterior transverse mark incised into the dermis, and the incision was completed by the electrocautery to start the dissection. Just inferior to the transverse incision at its lateral border, a small puncture incision was done to

bring out the posterior drain that was further secured by silk stitches.

Managing the inferior epigastric vessels is essential to achieving haemostasis, either by ligation or electrocauterization. Dissection was performed using electrocautery, keeping in mind to preserve any possible loose areolar tissue. As the dissection progressed to reach the umbilical stalk, the umbilicus was released, preserving some fat around it to maintain vascularity. This was followed by splitting the abdominal soft-tissue apron at the inferior part to be removed and visualising the superior part.

The dissection was extended upwards to reach the costal margins and xiphisternum, and the lateral-most part of myofascial laxity and the medial part of diastasis recti were marked with methylene blue. We performed myofascial plication using 0 looped nylon, beginning at the xiphoid and working our way down to the symphysis pubis with continuous sutures. Following the plication, 0.5% Marcaine was injected to minimise the postoperative pain under the anterior part of the rectus sheath followed by a single drain insertion to be brought out at the edge of the lower incision.

The resected area was determined by Pitanguy demarcator that help to measure and ensure the symmetry. The neo-umbilicus site was identified using Pitanguy demarcator followed by excision of a small area of skin and the surrounding tissue to be brought out through this excised area and fixed by Monocryl sutures [4/0].

To help with further wound closure, we flexed the operating table into a semi-sitting position to reduce tension was closed in three layers with Vicryl [1] in the deep fascia, 2 /0 in the superficial fascia in a continuous manner, and Monocryl [4 /0] subcuticular sutures. A water-impermeable dressing was used as a tissue adhesive.

Post-operative care

The following instructions were applied to all patients.

- During the 1st 1 – 2 weeks, patients should maintain a partially flexed position.
- Abdominal binder should be used at all times except during showering and should

be covering all the suture area with no folds, creases or drains under it.

- Smoking should be avoided, with drinking a plenty of fluids is advisable.
- Legs should be moved freely during rest or regular walking is recommended. However, vigorous activity should be avoided for at least 4 – 6 weeks.
- Instructions about the drain care and the prescribed medications should be used till removal of the drain and complete healing of the surgical wounds.
- In case of buttock augmentation, ample padding should be used when sitting.

In stable cases without complications, outpatient visits and follow up of patients postoperatively were done at 2 weeks, 6 weeks, 3 months and 6 months, or according to the condition of the case.

Statistical Analysis: Statistical analysis was done by SPSS v26 [IBM Inc., Armonk, NY, USA]. Categorical data were described as frequency and percentage with the comparison across groups by the Chi [X2] test. Continuous data were described as a mean and a standard deviation [SD] by t -test. Comparison between the preoperative and 3 months postoperative data was done by Paired t-test. At a P-value less than 0.05 the values were considered to be significant.

RESULTS

Table [1] showed that the patients had a mean age of 39.2±10.2 and the majority were

females 21[70%]. The mean BMI of the studied patients before the bariatric surgery was 44.6 ± 4.2, while the mean BMI after the bariatric surgery was 25.7±3.1. The mean weight loss was 39.7±5.4 Kg and the mean percent of decline in BMI was 42.8±5.8. The most commonly used was Sleeve gastrectomy 27[90%], followed by RYGBP Laparoscope 2[6.7%] and Gastric Banding procedures 1[3.3%] for each.

Table [2] showed that the mean resected weight from abdomen during abdominoplasty among the studied patients was 4.3 ± 0.7 Kg. The intraoperative time was 265 ± 21 minutes while the blood loss was 426.9 ± 195.7 ml. The mean Duration of drainage was 6.77 ± 2.42 days. The mean amount of drainage was 350 ± 261.20. The mean satisfaction rate among patients towards the abdomen during abdominoplasty was 94.5 ± 4.5. The mean hospital length of stay was 4.7 ± 1 days.

Table [3] showed that there were 9 [30%] cases with post abdominoplasty complications [at least one complication]. The most prevalent post abdominoplasty complication was wound dehiscence [2; 6.7%] then seroma [2; 6.7%], hypertrophic scar [1; 3.3%] and local hypoesthesia [2; 6.7%].

Table [4] showed that there was a significant negative linear correlation between the satisfaction rate and age and hospital stay among the studied patients [P-value<0.05].

Table [5] showed that there was a significant association between the occurrence of complications and lower satisfaction, longer duration of hospital stay and older age of participants [P-value<0.05].

Table [1]: Baseline characteristics of the patients under the study

Items		values [no=30]
Age [mean ± SD]		39.2±10.2
Sex	Female	21 [70%]
	Male	9 [30%]
Pre bariatric surgery BMI		44.6±4.2
Post bariatric surgery BMI		25.7±3.1
Mean weight loss		39.7±5.4
Percent of decrease in BMI		42.8±5.8
Bariatric surgery used	Sleeve gastrectomy	27 [90%]
	Gastric Banding	1 [3.3%]
	RYGBP Laparoscope	2 [6.7%]

Data are presented as mean ±SD or frequency [%], BMI: body mass index

Table [2]: Abdominoplasty circumstances among the studied patients

Items	values [no=30]
Mean Resection weight [Kg]	4.3±0.7
Operative time [Min]	265±21
Operative blood loss [ml]	426.9±195.7
No. of drains	3+0
Amount of drainage[ml]	350 ±261.20
Duration of drainage [days]	6.77± 2.42
Satisfaction rate [%]	94.5±4.5
Hospital length of stay [days]	4.7±1

Table [3]: Abdominoplasty complications among the studied patients

Items	Values [n=30]	
Complications	Skin necrosis	1 [3.3%]
	Wound dehiscence	2 [6.7%]
	Seroma	2 [6.7%]
	Hypertrophic scar	1 [3.3%]
	Local hypoesthesia	2 [6.7%]
	Infection	1 [3.3%]
	No	21 [70%]
Number of complications	0	21 [70%]
	1	5 [16.7%]
	2	3 [10%]
	3	1 [3.3%]

Table [4]: Correlation between the hospital stay and other independent variables

Independent variables	Satisfaction rate [%]	
Operative blood loss [ml]	r	0.055
	P-value	0.771
Operative time [Min]	r	-0.146
	P-value	0.441
Age	r	-0.377*
	P-value	0.040
Mean Wight loss [KG]	r	0.141
	P-value	0.458
Mean Resection weight [Kg]	r	0.019
	P-value	0.921
Hospital stay [days]	r	-0.398*
	P-value	0.029
Percent of decline of BMI	r	0.331
	P-value	0.074

r: correlation coefficient, *: significant as P value<0.05

Table [5]: Relation between the complications of abdominoplasty and different characteristics of the studied patients

Items	No.	Mean	Std. Deviation	P-value	
Mean Wight loss [KG] after bariatric surg	Non-Complicated	21	39.94	0.800	
	Complicated	9	39.41		
Mean Resection weight [Kg] during abdominoplasty	Non-Complicated	21	4.31	0.897	
	Complicated	9	4.28		
Operative time [Min] of abdominoplasty	Non-Complicated	21	139.78	0.532	
	Complicated	9	136.00		
Satisfaction rate [%] after abdominoplasty	Non-Complicated	21	97.50	<0.001*	
	Complicated	9	93.08		
Operative blood loss [ml] of abdominoplasty	Non-Complicated	21	10.26	0.975	
	Complicated	9	13.50		
Hospital stay after abdominoplasty [days]	Non-Complicated	21	1.05	0.004*	
	Complicated	9	1.50		
Percent of decline of BMI after bariatric surg	Non-Complicated	21	43.62	0.138	
	Complicated	9	40.38		
Age	Non-Complicated	21	35.50	0.011*	
	Complicated	9	44.83		
Sex	Non-Complicated	21	Females	14 [77.8%]	0.255
			Males	7 [22.2%]	
	Complicated	9	Females	4 [41.7%]	
			Males	5 [8.3%]	

Data are presented as mean ±SD or frequency [%], BMI: body mass index; *: significant as P value<0.05



Figure [1]: Male 38 years old, with 140 kg weight and 182 cm height, no past history of any disease or medications, with normal vital signs. After surgery had a weight of 90 kg. Pre and post Circumferential Abdominoplasty are shown

DISCUSSION

Recently, a dramatic increase has been recorded in the prevalence of obesity and overweight, making them a major health problem not only affecting adults but extending to children and adolescents as well [5].

Bariatric surgeries are usually associated with different anesthetic problems, so

abdominoplasty and other body contouring surgeries are essential to remove excess skin and restore the normal body shape [6].

The goal of our study was the evaluation of circumferential abdominoplasty with regards to the aesthetic outcome and patients' satisfaction following the surgery, in addition to the postoperative complications. The patients in our study had a mean age of 39.2, and the majority

were females [70%] aged 21 or younger. The mean BMI of the studied patients before the bariatric surgery was 44.6, while after the bariatric surgery it was 25.7, with a mean percent decline in BMI of 42.8. The mean weight loss was 39.7 kg.

These results agree with the study of **Le Gall et al.** who reported patients in their study had a mean age of 39.6 and females represented the majority of cases [86.7 %] ^[7]. Also, **Sozer et al.** found that their patients had a mean age of 45.2 and their age ranged from 25 to 71 years and more common in females ^[8]. The high prevalence among females could be attributed to the fact that the global prevalence of obesity is higher among females, and they are usually more concerned about their body shape ^[9].

Several studies were conducted about the efficacy of different types of bariatric surgeries on weight reduction. The results of **Schneck et al.** revealed that the pre-BMI of their patients was 42 and the mean of post BMI was 27.1 with mean percent of decrease in BMI by 38.8 % ^[10]. **Vico et al.** who demonstrated a decrease in the body weight by 37 kg following bariatric surgery ^[11].

According to the features of the surgical procedure, the mean operative time for the procedure in our study was 265 ± 21 minutes with a mean blood loss 426.9 ± 195.7 ml. The mean duration of stay in the hospital was 4.7 ± 1 days. The mean resected weight from abdomen during abdominoplasty among the studied patients was 4.3 ± 0.7 Kg. **Vico et al.** had the same results in their study with a mean resected weight about 4.6 kg. However, they reported longer operative time [about 306 minutes] and more blood loss [664 ml]. The difference could be explained by the perfect hemostasis performed in our patients ^[11]. **Sozer et al.**, showed that the mean time of surgery was 254 min in their study ^[8].

The duration of hospital stay vary from patients to the other according to the clinical improvement of the case and presence of complications. The study performed by Jones and Toft, reported that their patients stayed in hospital for average 3.5 days while **Vico et al.** reported that they stayed for average 8.8 days ^[11, 12].

There were 9 [30%] of cases who had post abdominoplasty complications [at least one

complication]. The most prevalent post abdominoplasty complication was wound dehiscence 2 [6.7%], seroma 2 [6.7%] and local hypoesthesia 2 [6.7%]. There was a significant association between the occurrence of complications and lower satisfaction, longer duration of hospital stay and older age of participants.

Lievain et al. revealed that, the overall complication rate recorded in their study was 42% recorded. Although, it seems to be high, however most of these complications are minor and easily managed conservatively ^[13].

Batac et al. showed similar results and revealed that the most common complications were seroma [10-15%], wound dehiscence [3-11%] and hematoma [2.4-3%] ^[14].

Different mechanisms could explain the occurrence of seromas. **Salari et al.** demonstrated that it usually occurs in the dead space between the flap and the fascia of the rectus abdominis muscle ^[15]. Other potential mechanisms included in the study of **Di Martino et al.** are injury of the blood vessels and lymphatics of the abdominal wall, broad undermining of the area, creating a dead space, and the release of inflammatory mediators ^[16].

The mean satisfaction rate among patients in our study was 95.7, which was consistent with **Domanski and Cavale**, who reported that about 93% of their patients agreed that it was a good choice to undergo the procedure, with an average satisfaction rate of 98%. The patients showed an increase in their life quality and self-esteem ^[17].

The satisfaction of the patient after circumferential abdominoplasty is essential as it is considered an elective surgery, so the risk/benefit evaluation should be evaluated for each patient ^[18].

In our study, there were no mortality or morbidity like thromboembolism as seen in other previous large study ^[6]. This can be emphasized by two reasons; first, most of our study participants were females, they have less hypercoagulative affinity than men.

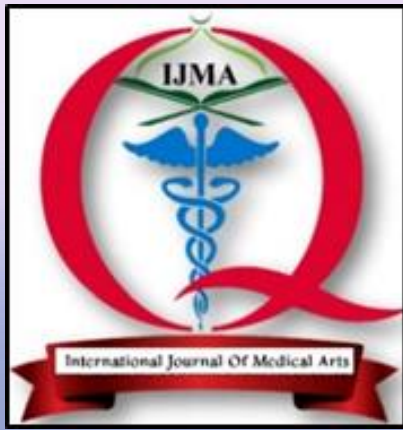
Limitations: Our study is a single center study. Further multi-center studies are needed to validate our results.

Conclusion: Circumferential abdominoplasty could be safely applied to patients with massive loss weight. This procedure provides a higher satisfaction rate with minimal rates of minor complications easily corrected and managed. Surgeons should keep in mind the risks and benefits when counseling patients preoperatively and optimize where possible.

Conflict of Interest and Financial Disclosure: None.

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