

High Superior Tension Abdominoplasty after Weight Reduction: Results of 25 Cases

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ABSTRACT

The low aesthetic outcome and high complication rate reported with the conventional technique of abdominoplasty especially in patients with massive weight loss raised the need to another technique with better results. This case series study was conducted in Zagazig University hospitals to evaluate the technique of high superior tension abdominoplasty in correction of the abdominal contour following massive weight loss. It included 25 patients, 23 females and 2 males. Some modifications of the original technique are described. The follow up period was 6-12 months (mean 8.6 ± 2.17). The postoperative wound complications were in the form of seroma in 1 patient, marginal flap necrosis in another one and hypertrophic scarring in the third one. In 92% of patients, the aesthetic outcome was good and they were satisfied about the result. Apart from the patients with general co-morbid factors, the technique of high superior tension abdominoplasty is reliable with good aesthetic results in patients seeking for abdominal contouring after massive weight loss.

INTRODUCTION

Demands for abdominoplasty are consistently increasing for diverse reasons. Bariatric procedures performed by general surgeons are becoming more famous and widely practiced. Skin redundancy following massive weight loss induced by this surgery or dieting leads to a demand for abdominoplasty. In addition, more and more patients are looking for an improvement of a moderate cutaneous excess following pregnancy [1].

A clear understanding of the arterial blood supply of the abdominal wall is crucial to operative planning. Huger's description of the different zones of the blood supply guides the surgeon in planning and performing a safe operation. Huger [2] defined zone I of the abdominal wall as the area that is fed anteriorly by the vertically oriented deep epigastric arcade. Zone II, is the lower abdominal circulation that is provided by the superficial epigastric, superficial external pudendal, and superficial circumflex iliac systems. Zone III was described as the lateral aspect of the abdominal wall (flanks) that

are fed by 6 lateral intercostal and 4 lumbar arteries. During abdominoplasty, the cutaneous blood supply to zone I and much of zone II is divided, with the abdominal flap circulation fully dependant on zone III [3]. In conventional abdominoplasty, the tension is maximally on the central lower part of the abdominal skin flap that has the poorest blood supply with the high risk of necrosis [4-7].

High superior tension approach to abdominoplasty has been described to minimize this complication. Maximum tension is transferred to the level of the umbilicus, an area in which vascularization is good, undermining is minimal and feeding vessels are nearby [6,7]. This allows for more excess skin excision, application of more tension to the epigastric region and hence superior aesthetic outcome and possibly less complications.

The aim of this work is to evaluate the technique of high superior tension abdominoplasty following massive weight loss with excessive skin redundancy, regarding the aesthetic outcome and the complication rates.

PATIENTS AND METHODS

From January 2005 till June 2007, 25 patients underwent high superior tension abdominoplasty. All of them suffered from skin redundancy of the abdomen following massive weight loss. Their ages ranged from 21-43 years (mean 32.08 ± 7.1). Patients' data are summarized in Table (1).

Preoperative evaluation and markings:

The patient is examined one day before surgery. Pre-operative photos are taken to the patient with good positioning, lightening and background. Surgical markings are done while the patient is standing. Clinical judgement whether the supra umbilical skin will reach to the pubis after removal of the intervening skin is made. The area of liposuction

is also marked. Further markings as the vertical midline, the periumbilical markings and the new umbilical site are made during surgery.

Table (1): Patients data.

Data	N (%)
<i>Gender:</i>	
Females	23 (92)
Males	2 (8)
<i>Method of weight loss:</i>	
Dieting	18 (72)
Laparoscopic bariatric surgery	7 (28)
<i>Body mass index (BMI):</i>	
20-25	17 (68)
26-29	7 (28)
34	1 (4)

Surgical technique:

All the procedures were performed under general anaesthesia with endotracheal intubation. On induction of anaesthesia, all patients were given a dose of third generation cephalosporin adjusted according to the body weight. Prophylactic measures against deep venous thrombosis (DVT) are taken in all patients in the form of good hydration and subcutaneous administration of low molecular weight heparin, started 12 hours before surgery and continued every 12 hours till the patient was fully ambulant.

We always do superficial and deep liposuction for the epigastric area using tumescent technique allowing the upper abdominal flap to be thin, supple and easier to be pulled downwards. This was done for all the patients except one patient with epigastric hernia.

The incision used is in a 'handle bar line' [8] (Fig. 1). In the midline, it is marked 7cm above the upper end of the vulval cleft [6] while tightening the pubic skin manually. The tissue lateral to the mons pubis is elevated superiorly and medially, then the incision reaches 7cm laterally on either sides and extended towards the anterior superior iliac spine along the inner side of the inguinal ligament.

The 3-, 6-, 9- & 12 o'clock positions of the umbilicus are needle tattooed and circumferential incision is made around the umbilicus. Two 4/0 silk threads are used to mark the 6 & 12-o'clock position of the umbilicus to prevent accidental

rotation of it at the time of repair. The umbilicus stalk is then dissected down to the fascia of the abdominal wall.

Flap undermining then proceeds starting from the incision cephalad with the help of a blunt ended scissors. In the hypogastric region, it goes leaving a thin layer of tissue overlying the abdominal aponeurosis to avoid injury of the lymphatic trunk going to the inguinal lymph nodes. Above the umbilicus, it goes directly on the aponeurosis to protect the lymphatic trunk going to the axillary lymph nodes within the flap. Undermining continues cephalad to the subcostal margin laterally and the xiphoid process centrally.

The flap is vertically incised exactly in the midline starting from its lower edge till the level of umbilicus. Then, the operating table is flexed 45° and tension is applied to the lower edge of the flap downwards and medially to obtain good tension laterally. The amount of skin to be excised is then marked and excised. Repair of recti diastasis then follows with plication of the muscle sheath in two layers, the first layer is accomplished by non-absorbable 0/0 Polypropylene suture (Prolene®, Ethicon, UK) from the umbilicus upwards to xiphoid then from the umbilicus to the pubis. The second layer was accomplished by interrupted 0/0 Polygalactin absorbable sutures (Vicryl®, Ethicon, UK). Then the operating table is flexed 45° and the lower edge of the flap is sutured to the pubis.

The new umbilical site is decided to be at least 2cm, or more, above the cutaneous projection of the umbilicus stalk that is below. This gap between the two sites is that allows for epigastric traction [6,7]. The design of the new umbilicus is elliptical. Then de-epithelialization of the new umbilical site is done and the opening is completed by the scissors tip (Fig. 2). The stitch taken at the lower edge of the flap is removed. The Paraumbilical sutures are then placed; two sutures are placed at 3- and 9-o'clock positions, (Fig. 3). We used 2/0 Polygalactin absorbable sutures (Vicryl®, Ethicon, UK). These stitches are used to suture the Para umbilical aponeurosis to the dermis of the new umbilical site (that was de-epithelialized). After tightening the two stitches, there is a visible vertical furrow due to strength of tension (Fig. 4). The umbilicus repair is then completed using half buried mattress sutures with 4/0 Polypropylene stitches (Prolene®, Ethicon, UK).

Before wound closure, the whole wound area is washed out with 500ml of normal saline to

remove any separated fat particles or blood clots. The wound closure is then completed in two layers; the deep subcutaneous layer with 3/0 Polydioxanone absorbable monofilament sutures (PDS®,

Ethicon, UK) and the skin with intradermal 4/0 Poliglecaprone 25 absorbable monofilament sutures (Monocryl®, Ethicon, UK) after placement of two suction drains coming out through the pubic skin.



Fig. (1): Design of the incision ('Handle bar line' incision) and marking of the area for epigastric liposuction.



Fig. (2): The new site of the umbilicus. The de-epithelialized parts are shown (arrows).

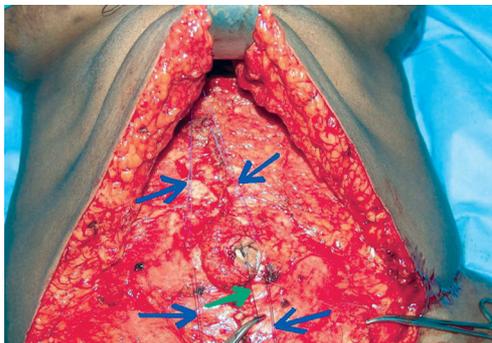


Fig. (3): The Paraumbilical sutures are placed in 3- and 9-o'clock positions (blue arrows). Silk 4/0 threads are used to mark 6 & 12-o'clock position of the umbilicus (green arrow).



Fig. (4): The umbilicus in its new position. The visible vertical furrow can be seen due to the strength of tension.

RESULTS

The follow-up period ranged from 6-12 months (mean 8.6 ± 2.17). In the early post-operative period; we did not have any serious complications as pulmonary embolism or DVT. Wound complications are summarized in Table (2).

The patient with seroma was treated by repeated aspiration and compression. The patient with lower flap necrosis was treated by debridement and repeated dressing till complete healing by secondary intention. The hypertrophic scar was treated by wound compression, massaging and application of silicone sheets.

Twenty three patients (92%) were satisfied about the post-operative cosmetic appearance. Comparison of the pre and post-operative photographs showed; improved tension of the whole abdominal wall especially the epigastrium, enhancement of the waist line and increased uniformity of the contour of the abdomen (Figs. 5,6). The unsatisfied patients were those of marginal flap necrosis and hypertrophic scar.

Table (2): Postoperative wound complications.

Complication	N (%)
Seroma	1 (4)
Marginal flap necrosis	1 (4)
Hypertrophic scar	2 (8)

Fig. (5): A 36 year old female patient lost 30kg body weight on dieting.



(A)

(B)

(C)

(A,B,C): Show the pre-operative views.



(D)

(E)

(F)

(D,E,F): Show the views 8 months postoperatively with significant improvement of the truncal contour and maintained epigastric tension. The incision is totally hidden even with the very low waist bikini.

Fig. (6): A 38 year old female patient lost 20kg body weight on dieting.



(A)

(B)

(C)

(A,B,C): Show the preoperative views.



(D)

(E)

(F)

(D,E,F): Show the views 6 month postoperatively with good contour of the abdomen and maintenance of the midline valley between the two recti.

DISCUSSION

Abdominoplasty is one of the most commonly performed procedures. It has undergone a significant evolution over the past decades. Many authors studied the different techniques and approaches trying to reach a technique that is safe with less complications and superior aesthetic results [4,9,10,11].

After massive weight loss especially induced by Bariatric surgery, there is an increased demand for abdominoplasty with increased risks of post-operative complications and difficult post-operative period. In these cases, a standard abdominoplasty technique does not permit a sufficient skin resection. The surgeon must perform a vertical infra-umbilical scar and will have insufficient epigastric tension which will have a poor aesthetic outcome [6,7].

Lockwood [4] defined the ideal abdominal aesthetics, as it is the abdomen with tight lateral trunk and inguinal tissue with deep waist concavity, central tissues not pulled tightly, with convexity of the hypogastrium and concavity of the epigastrium, presence of midline epigastric valley between the two recti muscles, vertically oriented umbilicus and no elevation of the pubic hair line.

In the standard technique of abdominoplasty, in order to achieve a good epigastric tension with good amount of excess skin resection, tension will be transferred to the lower edge of the flap, an area with extensive dissection and poor blood supply and this will increase the risk of flap necrosis and may lead to an aesthetic disaster. Also, this increased tension on the lower abdominal incision will lead to rising of the pubic hair line with poor aesthetic outcome [6,7].

The technique of high superior tension abdominoplasty which was described by Le Louarn and Pascal [6] has the following purposes; to avoid recurrence of epigastric skin excess, excise more skin and decrease tension on the new hypogastrium avoiding raising the pubic hairline and decrease risk of lower abdominal flap necrosis.

In this series, we used the technique of high superior tension abdominoplasty in 25 patients after weight reduction. Our incision was the 'handle bar line' incision described by Baroudi and Ferreira [8]. It has the advantages of hiding the scar below the Bikini line in addition to some upward lifting of the ptosed vulva. The same was reported by Le Louarn and Pascal [6,7].

Our technique shows some differences from the original technique [6,7]. We restricted the lipo-

suction to the epigastric area. Le Louarn and Pascal [6,7] performed liposuction to the epigastric and hypogastric areas. We found no need to do liposuction to the hypogastric area. The skin of this area is always removed during the procedure. So, we found no need to lose time in doing liposuction to an area of skin that will be removed. In the original technique [6,7], the liposuction of hypogastric area aimed at facilitating the undermining of the lower abdominal flap to preserve the layer of Scarpa's fascia on the abdominal aponeurosis to prevent injury to the lymphatic trunk going downwards to the inguinal lymph nodes to prevent lymph accumulation and seroma formation. The same purpose we could reach with our technique with leaving a layer of tissue overlying the abdominal aponeurosis without the need to liposuction.

Unlike others [6,7,12], we did not use quilting sutures to close the dead space. These sutures were described to prevent seroma formation. They are in the form of multiple stitches between the dermis of the abdominal flap and the abdominal aponeurosis. We were worried about entangling any of the cutaneous arteries supplying the abdominal skin flap during taking these stitches. We found that the use of suction drains for a period of 7 days achieves the same goal. Originally, Le Louarn and Pascal [6] inserted suction drains for 48 hours then they abandoned their use [7]. Another simple procedure we find it useful is the habit of keeping the tissue moist by rinsing it with normal saline throughout the procedure to prevent fat desiccation and necrosis with consequent tissue reaction and seroma formation. Washing the wound with normal saline at the end of the procedure to remove any blood clot or separated fat particles is another factor in preventing seroma formation.

In our series we had one case of seroma (4%). This was an overweight 35 years old female patient with BMI of 29 to whom liposuction was done for the epigastric area. We attribute this complication to the overweight of the patient and not to the procedure of liposuction as it did not happen to the rest of our patients who underwent liposuction. Many authors [13,14] do not correlate between seromas and liposuction and they find it correlated more to overweight.

We had one case (4%) of marginal flap necrosis, she was a 40 years old female patient, with multiple pregnancies, poorly controlled diabetic, obese and her BMI was 34. We refer this complication to poor selection of the patient. She had multiple comorbid factors, first was the diabetes mellitus which has, especially when poorly controlled, a bad impact on wound healing. The pathophysiologic

relationship between diabetes and impaired healing is complex. Vascular, neuropathic, immune function and biochemical abnormalities, each contribute to the altered tissue repair [15]. Rogliani et al. [14] showed that obesity at the time of abdominoplasty has a profound influence on the wound complication rate following surgery. Le Louarn and Pascal [6] reported in their big series of 425 patients a flap necrosis rate of 1%. Van Uchelen et al. [16] reported a series of 86 patients with abdominoplasties. They classified complications as wound complications that included infection, dehiscence, seroma, marginal flap necrosis and/or haematoma, or complications after surgery (DVT, pulmonary embolism, ileus, death). They reported 20 patients (23.2%) had wound complications and they referred this to the presence of co-morbid factors as hypertension, smoking, diabetes mellitus and body mass index greater than 30. If we exclude the patient of hypertrophic scar, our early postoperative wound complication rate will be 8% which compares well with that of Van Uchelen et al. [16].

In our series we did not have serious complications as DVT or pulmonary embolism, thanks to prophylaxis against DVT using low molecular weight heparin starting 12 hours before surgery, good hydration and the early ambulation on the next day of surgery [17]. Le Louarn and Pascal [6] reported that they keep the patient in bed with flexed knees and hips for 48 hours. We find it a long period for an overweight patient with the risk of DVT and embolism. We encouraged our patients to move starting on the next day after surgery but with leaning forward and slight flexion of hips and knees.

Among the advantage of high superior tension abdominoplasty technique is the natural looking of the abdomen. The elimination of the epigastric bulge encountered in conventional abdominoplasty was achieved by the epigastric liposuction and the tension applied to the epigastric skin instead of the hypogastric area in addition to adequate plication of rectus aponeurosis [6,7]. We could achieve these advantages in 92% of our patients who were satisfied about the aesthetic result. They were happy with the significant improvement of the antero-posterior and lateral silhouette, also with the significant tension of the epigastrium that was noticed even in sitting down or lying forwards, thank to more skin excision and the para-umbilical stitches that allowed applying more tension on the epigastric region without fear of flap necrosis or elevation of the pubic hairline.

Conclusion:

We concluded that the technique of high superior tension abdominoplasty is a very reliable

technique for abdominal skin redundancy following massive weight loss. It allows more excess skin resection, more tension on the epigastrium with superior aesthetic outcome and lesser complications compared to the standard abdominoplasty. Patients with co-morbid factors carry the risk of post-operative wound complications.

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