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RESEARCH ARTICLE

"Abdominoplasty with "En block" removal of the skin island: a safe and fast approach"

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ABSTRACT

The aim of abdominoplasty is to restore a normal abdominal contour, with minimal signs of the surgery. The purpose of this study was to determine the feasibility, safety, and advantages of en block removal of a skin island before upper abdominal dissection during abdominoplasty. Five hundred-forty female patients who underwent abdominoplasties between January 2004 and December 2018 were retrospectively analyzed. In these cases, the planned skin resection was initially made en block, as done with an elliptic skin excision. In this way, symmetric skin removal is achieved. After the removal of this skin, epigastric skin undermining was easily achieved. The mean age of the patients was 41.4 y, and the mean body mass of index was 27.3 kg/m^2. The mean operative time for abdominoplasty only was 98 min. Eight patients had minor skin problems, 22 patients needed aspiration for seroma formation, and 7 patients needed scar revision surgery. There was only one hematoma postoperatively. The final position of the scar from the upper vulvar commissure was 8.9 cm. The results obtained were comparable to those of classical abdominoplasty, suggesting that en block removal of the skin before upper flap dissection is a safe maneuver. En block removal of skin island at the start of the surgery has the added advantage of a reduced operative time and acceptable aesthetic outcome, without an increase in complication rates. In cases of planned abdominoplasties, we suggest that removal of the abdominal skin at the beginning of the operation is a safe and feasible procedure.

Abbreviation: PDS: polydioxanone

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Abdominoplasty; skin removal; safety

Introduction

Abdominoplasty is a commonly requested procedure to remove excess skin and restore the abdominal contour. Lower and shorter scars, with a natural appearing umbilicus are some of the most desired attributes of this procedure [1]. To achieve these attributes, many new technical modifications have been introduced [2]. The current state of the art in abdominoplasty is to start the operation with extended liposuction of the entire abdomen, followed by umbilical stack circumcision, a suprapubic incision, and epigastric tunnel undermining. The undermined upper flap is pulled down to reach the inferior suprapubic line, and the excess skin is finally resected and sutured. There are two problems with this approach. First, it can be very difficult to retract the abdominal flap during epigastrium undermining, especially in cases of large heavy abdomens. In such cases, two assistants or nurses may be needed to elevate and retract the abdominal skin during undermining. Second, when the undermined abdominal skin is pulled down to determine the amount of skin to be resected, asymmetric skin may be removed from the two sides, which will eventually leave an asymmetric scar.

To overcome these issues, we use an approach where a designed (planned) skin resection is initially made en block, as done in an elliptic skin excision. In this way, symmetric skin removal is achieved. After this skin removal, epigastric skin undermining is easily achieved. We describe a series of 540 patients who underwent direct skin removal abdominoplasty, with concurrent circumferential liposuction over a 14-y period. We discuss the details of the technique, in addition to the outcomes and complications.

Patients and methods

Study population

Five hundred-forty female consecutive patients who underwent surgery between 2004 and December 2018 with an indication for standard abdominoplasty due to skin excess and musculofascial laxity were included in the study. All the patients were reviewed retrospectively in terms of operative records, operative times, complications, and liposuction amounts.

Surgical markings

The goal was to obtain a symmetrical and harmonious incision and scar that would not be visible while wearing a standard bathing suit bottom. The initial marking was done with the patient in a standing position, and the areas for liposuction were outlined. With the patient in a sitting position, the lateral extent of the lower skin incision was identified and marked on either side. The lateral extension of the skin incision should terminate beyond the hang of skin created from the excess abdominal skin, and it frequently ends past the anterior axillary line. With the patient in a supine position, the midline of the lower skin incision line was

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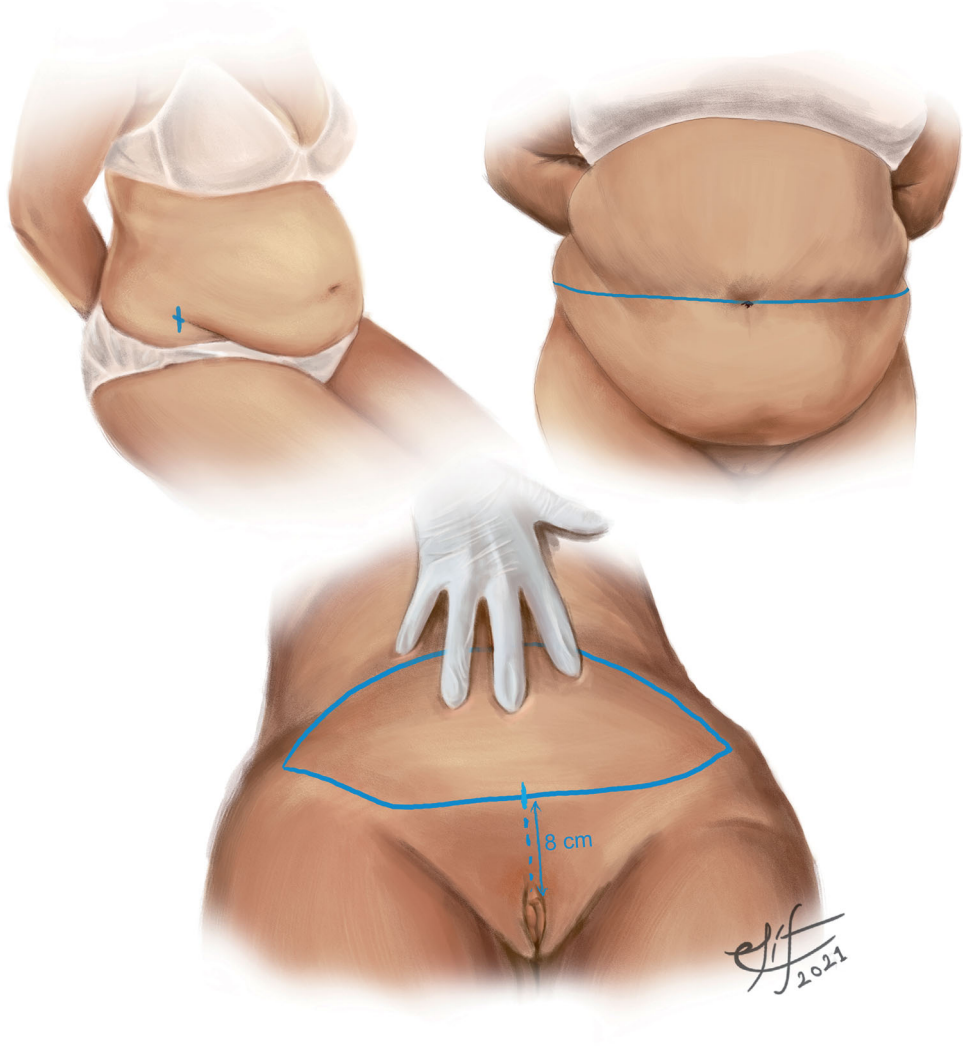

Figure 1. In a sitting position, the lateral extent of the lower skin incision is identified and marked on either side. In a supine position, the midline of the lower skin incision line was delineated 8 cm from the upper vulvar commissure by forcefully stretching the abdominal skin or pulling the abdominal skin upward. An oblique line was drawn from the top of the umbilicus to connect both ends of the lower incision line to delineate the upper incision line and complete the ellipse.

delineated 8 cm from the upper vulvar commissure by forcefully stretching the abdominal skin or pulling the abdominal skin upward. Traction was ensured by having an assistant push the abdominal skin upward. A low transverse suprapubic inferior incision was marked laterally 1–2 cm above and parallel to the inguinal crease on either side. The length of the incision was symmetric in length and design, taking care to ensure that it did not violate the upper border of the bottom of the patient's bathing suit. With the patient in a standing position, an oblique line was drawn from the top of the umbilicus to connect both ends of the lower incision line to delineate the upper incision line and complete the ellipse. The abdominal excision was essentially an ellipse of skin between the umbilicus and mons pubis (Figure 1).

Surgical technique

All the patients are evaluated by an anesthesiologist and underwent appropriate blood and diagnosing tests. All operations were performed under general anesthesia. Thromboembolism deterrent stockings were routinely used. A pharmacological intervention for venous thromboembolism prophylaxis was routinely employed. Broad-spectrum antibiotics were employed perioperatively and continued until any drains that were used were removed.

Every operation started with the patient in the prone position. Areas requiring liposuction were infiltrated with tumescent solution. Ultrasound-assisted liposuction was performed in the lower back and other areas, if needed. Later, the patient was placed in a supine position, where liposuction of the upper abdomen and pubic area was performed to reduce the subscarpus fat. After liposuction, the umbilicus was incised circumferentially, and the umbilicus was freed from the surrounding soft tissue and left attached to its origin. An upper skin incision and lower skin incision were then made down to the scarpa fascia. The incision was done while beveling the incision 30–45 angle outwards to remove more fat under the remaining skin flap. Superficial inferior epigastric vessels were detected and divided. The entire skin was then removed en block from the abdomen, starting from one end of the abdomen and moving to the other end. An epigastric tunnel was then undermined to the xiphoid process. This dissection is performed quickly because of the short distance to the xiphoid. The rectus muscle diastasis was identified, and plication of the muscle aponeurosis was accomplished using a running looped monofilament 0 polydioxanone (PDS II, Ethicon Somerville, NJ) suture. The operating table was flexed 30–45 degrees to facilitate closure, and the upper flap was stretched down to the suprapubic line. A temporary stitch was placed at the midline. The wound

Figure 2. A 48-y-old patient underwent breast reduction surgery, umbilical hernia repair, and abdominoplasty with liposuction. Removing the excess abdominal skin at the beginning of the operation facilitated umbilical hernia repair. Scar maturation 6 y after the operation.

Figure 3. A 38-y-old patient had major diastasis recti after three pregnancy. Rectus plication led to a major improvement in the appearance of the abdominal bulge, as shown in a postoperative image 2 mo later.

edges were temporarily aligned with staples from lateral to medial to decrease dog ear formation. Following this maneuver, the patient's midline was verified, the location of the new umbilicus was determined, and the umbilical stack was exteriorized through a 1.5-cm horizontal incision. The umbilicus was not tacked down to the fascia. Deep absorbable sutures were placed from the umbilicus to the skin flap, and the umbilical skin was then closed using a 3-0 intradermal absorbable monofilament suture. Two drains were inserted in the suprapubic region Closure is performed in a layered fashion starting with superficial fascia using interrupted 0/0 polydioxanone (PDS) suture. Final skin closure is performed in a layered fashion with deep dermal 2/0 Monocryl and continuous intradermal 3/0 Monocryl suture. While in the operating room, an abdominal binder was placed to achieve compression around the surgical site (Video1).

Results

Five hundred-forty female patients with a mean age of 41.4 y (range, 22–68 y) and a mean body mass index of 27.3 kg/m2 (range, 18.1–35.5 kg/m^2) who underwent abdominoplasty between 2004 and 2018 were followed up for a mean period of 14 mo (range, 3–61 mo). The mean duration of the abdominoplasty was 98 min (range, 85–100 min), not including the liposuction time. Simultaneous breast surgery (breast augmentation, breast reduction, and mastopexy) was performed in 190 (35%) patients. Forty three patients (7.9%) were massive weight loss patients. All patients stayed in the clinic overnight. Drains were removed when the output was less than 30 ml per 24 h period which corresponded between third and seventh days after the surgery. Patients with complex medical conditions and patients who had combined procedures lengthening the duration of the surgery stayed more than one night in the hospital. The average in-hospital stay was 1.7 d.

Complications

We encountered no problem in closing the abdominal skin in any of the patients. No skin flap necrosis was observed in any patient. Eight patients had minor skin healing problems. Minor healing problems were managed conservatively until the blood supply to the abdominal skin stabilized. A revision of either the excision with reclosure or scar revision was then done. The most frequent complication ($n = 22$) was the formation of a seroma, which had to be aspirated. The mean number of aspirations was 4 (range, 1–6). A hematoma was observed in one patient. The average final position of the scar was 8.9 cm from the upper vulvar commissure. Scar revision and 'dog ear' correction were required in seven patients. Wider scars were directly proportionate to the tension applied on the wound. To date, there have been no cases of thromboembolism. To prevent thromboembolism, we used all possible types of prophylaxis, including having the patient wear postoperative stockings, early mobilization, and postoperative massage of the calves. None of the patients required a transfusion (Figures 2–7).

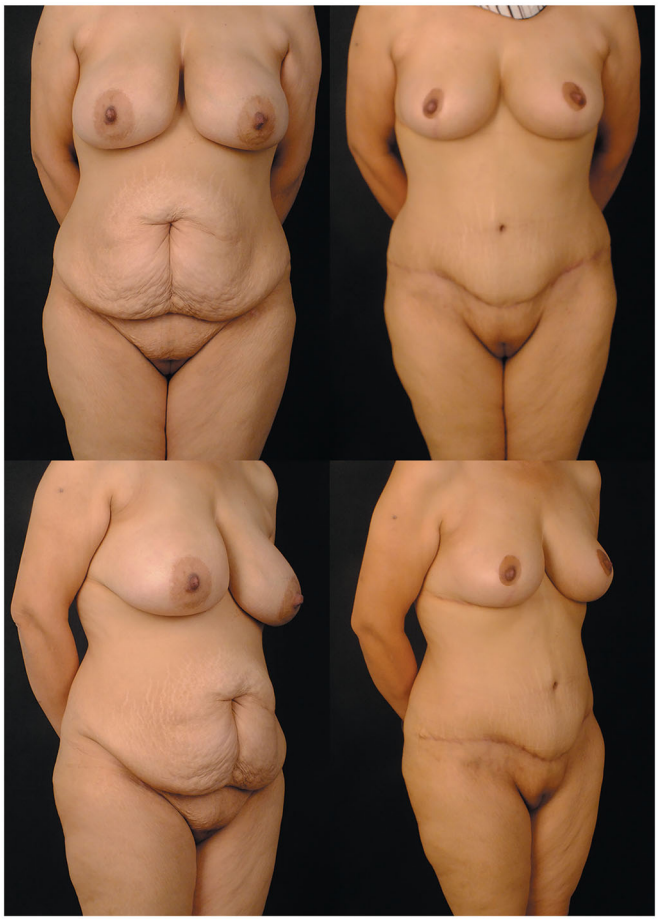

Figure 4. A 54-y-old patient with abdominal laxness, striaes, and rectus abdominis diastasis. The same patient 8 mo after surgery. The patient also had breast reduction surgery.

Figure 5. A 37-y-old patient had two cesarean sections and lost 45 kg after bariatric surgery performed 2 y earlier. The patient underwent breast reduction surgery and an abdominoplasty. Postoperative 7 mo.

Discussion

Abdominoplasties are widely performed worldwide, with minimal complications and few differences in the operative technique applied. One difference is that the design and length of the lower incision may differ, depending on the technique applied. Previously described techniques involve removal of excess skin after the upper abdomen and epigastrium dissection [1–3]. After skin dissection, the skin is pulled down, and the skin is removed. Interestingly, in almost all previously described techniques, the upper incision line is drawn during the preoperative marking stage, but upper incision is not made until the surgeon is absolutely sure that the abdominal defect will close. Surgeons appear to be reluctant to make this upper incision cut at the same time as the lower incision cut at the beginning of the operation. In our clinical practice we are in favor of the en block abdominal skin resection since 2004. We have noticed that similar philosophy has also been proposed by Sidney Vernon in 1957 and later by Ronaldo Pontes in 2004 [4, 5]. Following the footsteps of Pontes several Brazilian Plastic Surgeons also reported their experiences with this technique [6, 7]. In 2001 Saldanha et al. reported the importance of superficial liposuction with selective undermining while removing the excess skin en block [8]. Bertheuil et al. adapted this philosophy to circumferential body contouring after massive weight loss [9]. As shown by the series described in the present study we have never encountered a case where it was difficult to bring the upper and lower abdominal skin incision lines together after removing the skin island at the beginning of the operation. Same experience has also shared in these previous papers.

Removing the abdominal excess skin before the abdominal dissection has a number of benefits. First, the symmetry of the resulting abdominoplasty scar is always symmetric, as it needs to be for aesthetic reasons. As Pascal et al. [3] stated 'nothing is less aesthetic than an asymmetric incision line'. If the upper incision is made after skin dissection and after pulling down the excess skin, there is a relatively high possibility of making an asymmetric cut between the two sides. The final scar in such cases will be asymmetric. However, making the upper skin incision according to the preoperative markings at the beginning of the abdominoplasty will ensure perfect symmetry of the incision and scar. Incorrect preoperative markings may also lead to postoperative abdominal scar asymmetry. Symmetry is the essence of aesthetic surgery, and abdominal scar asymmetry may have a significant impact on the patient's satisfaction. With the described technique, the aesthetic result is determined largely by the preoperative markings.

Another benefit of the described technique is that removal of the excess skin makes the upper abdominal skin dissection easier. As noted earlier, difficulty retracting and dissecting the upper abdominal flap when the excess skin is still attached is relatively common, especially in cases of heavy abdomens. To overcome this issue, using other techniques, the excess skin at the midline from the suprapubic incision to the upper incision line was divided. This maneuver created two separate flaps in each side that

Figure 6. A 42-y-old patient 6 mo after breast reduction surgery and abdominoplasty.

had to be retracted by two assistants in order to reach the xiphoid process. When the excess skin was separated into two parts, they were pulled down one by one and removed according to the judgment of the surgeon. This approach can be misleading. Furthermore, if the excess skin remains attached during dissection of the abdominal skin, the time spent on dissection and then adjustment to remove the skin will be longer. We demonstrated that removal of excess skin at the beginning of abdominoplasty clearly facilitates and shortens the operation as compared with previous reports [10, 11].

Using our approach, undermining, which is necessary to provide exposure to a lax abdominal wall and to allow redraping of the skin, can also easily be achieved. Reluctance on the part of surgeons to remove excess skin at the beginning of abdominoplasty is understandable due to a fear of being unable to close the defect at the end of the operation. During the past 15 y, we have operated on more than 540 patients using the approach described herein, and we have never experienced any difficulty closing the abdomen or had any cases of major skin necrosis. Some cases were closed easily, whereas others were closed under more tension. Scar hypertrophy was not any more frequent than in classical abdominoplasty.

'Vest over pants' technique introduced by Planas [12] and later popularized by Matarasso [13] shares some principles with our approach. Since the upper incision is done first there are also able to use the advantage of easy and quick undermining of the upper epigastrium flap because of the short distance from the umbilicus to the xiphoid. But they pull down the undermined upper flap over the intact infraumblical region to locate the place of the suprapubic incision. Thus the lower incision is not made at a precise location and eventually the chance of high riding scar and exaggerated raising of the hair-bearing pubic region are increased. We believe low transverse incision should be essential in abdominoplasty.

When we compare our data with those in previous reports on abdominoplasties, the results were similar, with a low percentage of complications [13–15]. However, it should be noted that patient selection is crucial to ensure that the patient benefits from the en block skin removal technique. If the skin is tight, then liposuction only may be sufficient. Depending on the severity of the deformity, miniabdominoplasty may be considered. On the other hand, if skin laxity is significant, abdominoplasty with direct excess abdominal pannus removal should be considered. The majority of patients presenting for abdominal body contouring are candidates for en block resection abdominoplasty. Preoperatively grasping the excess lower abdominal skin after 30 degrees of trunk flexion and joining the examiner's finger tips, known as Matarasso maneuver, helps to identify this group of patient [13]. In terms of clinical classifications, the technique described herein is best suited to Bozola type III–V abdomens.

Massive weight loss patient often requires a resection of tissue well above the level of the umbilicus. In this group of patient further adjustment may be required. Ideal candidates are those with indications for traditional abdominoplasty with rectus diastasis, skin laxity, and significant excess adiposity requiring liposuction.

With respect to complications, a seroma was the most common complication in our series. The complication rates were acceptable and were consistent with those reported in the literature [16–21]. We believe that seroma formation is related to the amount of liposuction and that abdominal drains are needed to overcome seroma formation. In our series, there were no cases of major skin necrosis, which demonstrates the reliability of our technique.

Conclusion

Abdominoplasty with en block removal of an excess abdominal skin can be performed with minimal complication rates and successful outcomes. It has the added advantage of a reduced operative time with acceptable aesthetic outcome and without an increase in complication rates. In an era of diminishing abdominoplasty related costs and morbidity, it is important to highlight all surgical strategies that can improve outcomes and reduce complications of a full abdominoplasty.

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Ethical approval

The studies have been approved by the appropriate institutional research ethics committee and have been performed in accordance with the ethical standards as laid down in the 1964

Figure 7. A 44-y-old patient 3 mo after abdominoplasty who had delivered five babies and was a smoker. The diver's view shows the benefit of strong myofascial plication.

Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from the patient for being included in the study.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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