

8 Full Abdominoplasty

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8.1 Introduction

For the patient seeking abdominoplasty, there is a list of common desires: a desire to decrease loose, draping skin, have a tighter, flatter abdomen and improve the abdominal contour. It is well recognized that exercise and diet are the best strategies to ensure many of these goals. However, despite appropriate exercise and diet, certain groups of people cannot reach these desired goals. Weight loss can decrease the subcutaneous fat layer and intra-abdominal volume but cannot improve loose, draping skin. Also, pregnancy induces changes in the vertebra column, ribs and pelvis resulting in an enlargement in the transverse diameter of the abdomen. The tone of the musculoaponeurotic system may be weakened [1]. In addition; operations on the abdominal wall and hernias may further weaken and partially denervate the musculoaponeurotic system [2]. The standard abdominoplasty is one of many techniques used for abdominal aesthetic surgery. This procedure, which consists of dermolipectomy and musculoaponeurotic tightening, is extremely effective in restoring the abdomen to its youthful shape in most patients.

8.2 Indications

The appropriate patient for standard abdominoplasty has excessive, loose, sagging, abdominal skin, lax abdominal fascial wall and/or diastasis recti [3]. Typically there is pronounced skin laxity; more than 6–8 cm of skin needs to be excised in the vertical dimension. Extensive undermining is necessary to provide exposure to a lax abdominal wall and to allow redraping of the skin. The muscular aponeurotic system, subcutaneous fat thickness, and skin are analyzed. Each system is addressed with the standard abdominoplasty.

General indications for abdominoplasty include the improvement of body contour, removal of redundant skin, removal of excess adipose tissue and removal of scar deformities including striae. Specific indications

for the standard abdominoplasty are the following: excessive, loose, draping, abdominal skin which requires greater than 6–8 cm of excision in the vertical dimension; marked epigastric fullness; significant supra- and infraumbilical skin laxity and musculoaponeurotic relaxation; and ventral hernia with abdominal wall relaxation.

In recent years we have observed the increasing success of bariatric surgery. Following significant weight loss, these patients require marked contouring of the trunk. A standard abdominoplasty is often a part of the body contouring procedure for this group of patients.

8.3 Preoperative Evaluation

The preoperative evaluation may highlight some important considerations. An estimate of the vertical amount of skin to be excised is made by the pinch test. Presence of flank rolls or fullness is noted which may require liposuction or extended lateral excision. Abdominal scars, which may compromise skin flap viability, are noted. Ventral hernias are ruled out by exam in the upright and supine position, with and without Valsalva maneuver. A thick subcutaneous fat layer may obscure a hernia. Musculofascial laxity is most noticeable from the lateral view with the patient bent forward at the waist. Muscle firmness and diastasis recti can be evaluated in the supine sit up or leg lift position. If the fat layer is thin enough, the rectus borders may be seen. Lumbar lordosis may contribute to an apparent lax muscle wall. The patient may be classified as short waisted or long waisted depending on the vertical distance between the iliac crest and thoracic cage in proportion to the pelvic width. The skin flap design may be adjusted according to a long or short waist to provide the most pleasing frontal contour.

8.4 Skin Markings

Preoperative markings in the standing position are placed prior to surgery [4]. A low transverse suprapubic inferior incision is marked. Lateral ends should be turned up to avoid crossing the inguinal crease. With the patient in the standing position, it is helpful to mark the midline from xyphoid to umbilicus to the anterior vulvar commissure (Fig. 8.1). Two transverse lines are marked, one just above the umbilicus perpendicular to the midline from lateral rectus edge to contralateral rectus edge and a lower transverse line in the low transverse position, which is usually 5–7 cm above the anterior vulvar commissure (Fig. 8.2). The length of this line is kept the same length as the superior transverse line, thus marking out a grid on the abdomen. When the lower line is marked, traction should be placed by an assistant upward on the abdominal skin. Now a gentle curving line is drawn from the ends of the low transverse line up toward the iliac spine, either lateral or medial to the anterior spine depending on the abdominal contour. The lateral edges are adjusted to fall within the lines of the patient's usual undergarments and bathing suit. Tan lines are helpful in adjusting the lateral ends. An estimate of the position of the superior edge is marked at or slightly above the umbilicus. The superior line is drawn in a gently curving fashion down to the lateral apex of the inferior line. The more the lateral ends are turned up, the less the waist is narrowed in the frontal view. Less narrowing of the waist may be desirable in the short waisted abdomen or the abdomen with a short vertical height. Areas that are to be liposuctioned are marked with crosshatching (Fig. 8.3).

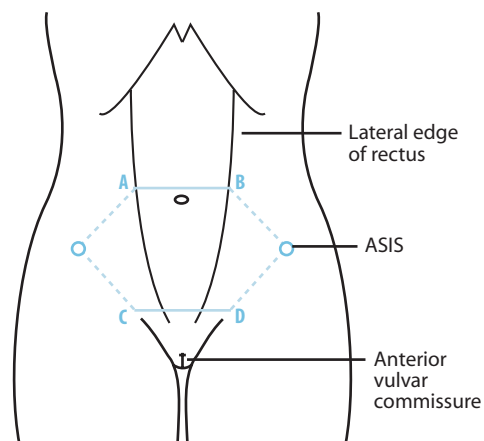


Fig. 8.1. Skin markings and landmarks



Fig. 8.2. Intraoperative photograph of skin markings

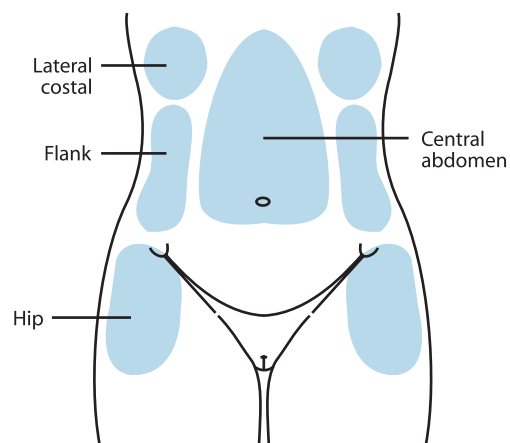


Fig. 8.3. Liposuction of the central abdomen to improve upper abdominal fullness. Liposuction of only one of the remaining collateral circulation zones (lateral costal, flanks, hips)

8.5 Surgical Anatomy

The vascular territories of the abdominal wall are divided into three areas based on the origin of their vascular supply. This description comes primarily from the work of Nahai, Brown and Vasconez [5]. Zone I covers the area from the xyphoid to the pubis overlying the rectus muscles and is supplied primarily by the deep epigastric arcade. Vessels coming from the lateral abdominal wall supply secondary perfusion. Zone II covers the area across the lower abdomen below a line drawn at the level of the anterior iliac spine and limited inferiorly by the pubic and inguinal creases. The exter-

nal iliac artery supplies Zone II via the superficial epigastric, the superficial external pudendal arteries, and the superficial circumflex iliac artery. Zone III bilaterally covers an area around the flank lateral to Zone I. Intercostal, subcostal, and lumbar arteries perfuse zone III. The venous and lymphatic drainage follows a concomitant pattern of the arterial supply. The motor and sensory innervation is derived from the lower seven thoracic intercostal nerves and the iliohypogastric branch of the first lumbar nerve. The motor nerves run in the layer of the internal oblique toward the lateral edge of the rectus muscles.

The umbilicus has a very rich central vascular supply. The perifascial plexus as well as preperitoneal vessels supply it.

The importance of describing this vascular anatomy of the abdominal wall is to maintain at least one of the zones intact to perfuse the abdominal skin and fat. This identifies the importance of maintaining the circumflex iliac vessels in the lower lateral abdomen and the more lateral vessels of the flank and lateral costal regions.

8.6

Operative Technique

The patient is positioned supine with pillows under the knees to relieve stress on the sciatic nerve if the table is to be flexed. The abdomen up to the mid-chest and down to the groins is prepped and draped. A long 2–0 silk is placed at the xyphoid that can be stretched down to the vulvar commissure to mark the midline. Four points are marked on the superior and inferior lines at the lateral edge of the rectus. Temporary sutures are placed at each of these points. One-half percent lidocaine with epinephrine 1:200,000 is injected along the planned lines of skin resection. The umbilicus is incised down to the fascial level. This is facilitated by placing single hooks at the 12 o'clock and 6 o'clock positions on the umbilicus, upward retraction, and incision with an 11-blade perpendicular to the stalk of the umbilicus on each side of the umbilicus. The skin hooks are then repositioned to the 3 o'clock and 9 o'clock positions and retracted upward and the incision is completed across the superior and inferior edges of the umbilicus. The dissection down to the fascia is completed with Metzenbaum scissors. The low transverse incision is made down to the muscle fascia. Superficial inferior epigastric vessels are controlled and divided. A low midline cut is made from the previously incised umbilicus to the lower incision. Each hemi flap is elevated to the upper incision line (Fig. 8.4). Rectus perforators are double hemoclipped and divided. It is important to control these perforators to avoid troublesome bleeding or rectus sheath hematoma. Undermining is continued at the level above the muscular

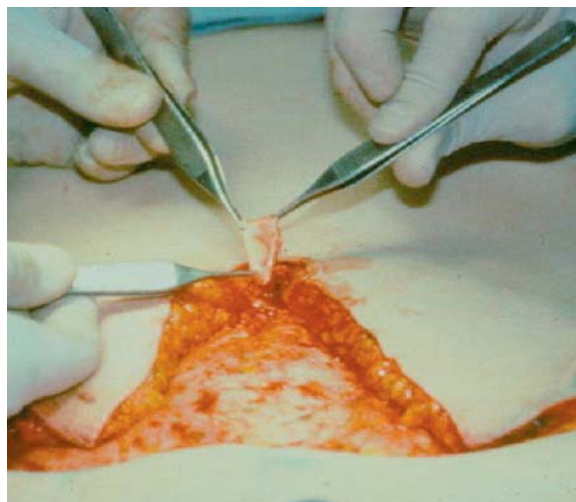


Fig. 8.4. Low midline incision separating the hemi-flaps

fascia to the costal margins and xyphoid. Large perforating vessels along the anterior axillary line are identified and maintained as much as possible.

Tightening of the abdominal wall is planned and completed before skin resection. Diastasis rectus is repaired (Fig. 8.5). The anterior rectus sheath at the medial edges of the rectus muscle is plicated with a running double stranded O-nylon effectively repairing the diastasis (Fig. 8.6). Care is taken to avoid strangulation of the umbilical stock as it protrudes from this repair. Further tightening and shaping of the abdominal wall is provided by external oblique advancement “the internal corset” as described by Psillakis [6]. The medial edge of the external oblique fascia lateral to the rectus abdominis muscle is incised with the upper limbs gently curving laterally and lower limbs gently curving me-

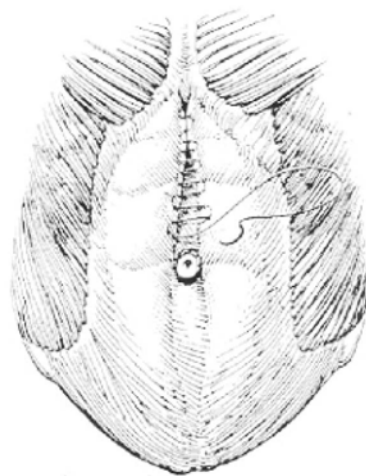


Fig. 8.5. Approximation of anterior rectus sheath at medial edge of rectus muscle to repair diastasis recti



Fig. 8.6. Intraoperative photograph of diastasis recti repair

dially (Figs. 8.7, 8.8). This aponeurosis and the external oblique muscle are elevated from the internal oblique fascia and muscle laterally to the anterior axillary line. The contralateral external oblique fascia and muscle are similarly elevated. Allis clamps are placed on the edges of the external oblique aponeurosis. Medial traction is applied until the desired tightening of the abdominal wall and waist shape are obtained (Fig. 8.8). The new position of the external oblique aponeurosis is marked with methylene blue. Figure of eight stitches of O-prolene are placed to secure the advanced fascial

edges. This is followed by a running double strand O-nylon. Tightening of the abdominal wall improves abdominal protrusion and shapes the sides of the abdomen in the frontal view (Fig. 8.7). External oblique advancement is particularly nice for the long waisted or vertically long abdomen with relatively thin subcutaneous fat pad.

Resection of the abdominoplasty flap is done after the abdominal tightening. The superior skin edges are pulled down over the inferior edge and marked to remove redundant skin (Fig. 8.9). This should correspond to the superior key stitches placed earlier. The skin flap is resected and hemostasis of edges obtained (Fig. 8.10). If necessary, lipectomy is performed now. Direct lipectomy is done deep to the Scarpa's fascia in the central abdomen. Careful suction assisted lipectomy is done in the superficial fat pad above the Scarpa's fascia if necessary but crosshatching is avoided. The lateral apices of the wound may require suction assisted lipectomy or direct lipectomy to provide a smooth contour in this region where dog-ears typically occur [7]. Suction assisted lipectomy may be done safely no more than 5–10 cm from the edges of undermining or vigorously in no more than one of the three adjacent regions (lateral costal, flank, or hip) [8]. Selective defatting in the supraumbilical region to create a midline depression produces a desirable medial sulcus and accentuates the medial rectus border [6]. Selective defatting laterally helps to accentuate the lateral rectus edges.

The lengthened umbilical stock is dealt with by plicating the umbilicus to the abdominal wall; 3-0 nylon dermal to fascial sutures is placed every 120 degrees around the umbilicus. This plication helps to provide a desirable periumbilical depression. With the skin edges

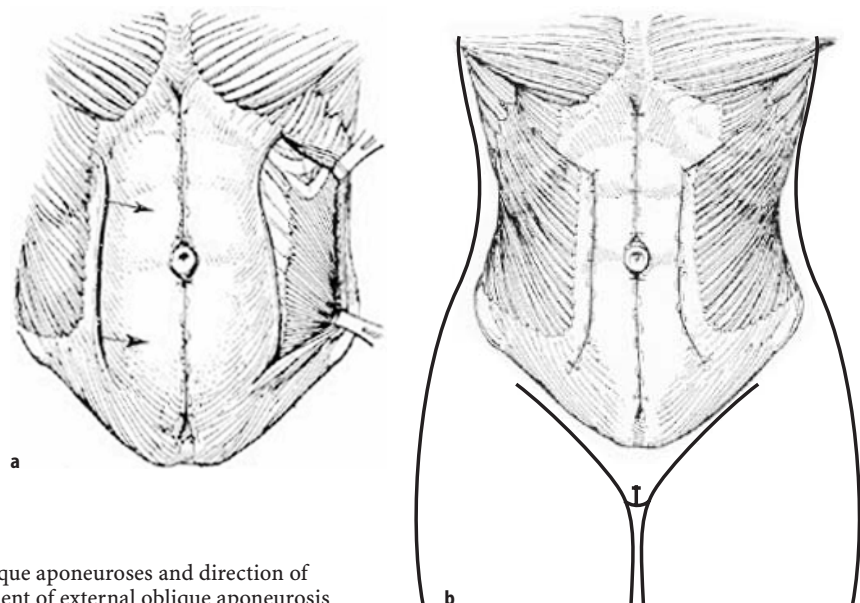


Fig. 8.7. **a** Incision of external oblique aponeuroses and direction of advancement. **b** Medial advancement of external oblique aponeurosis

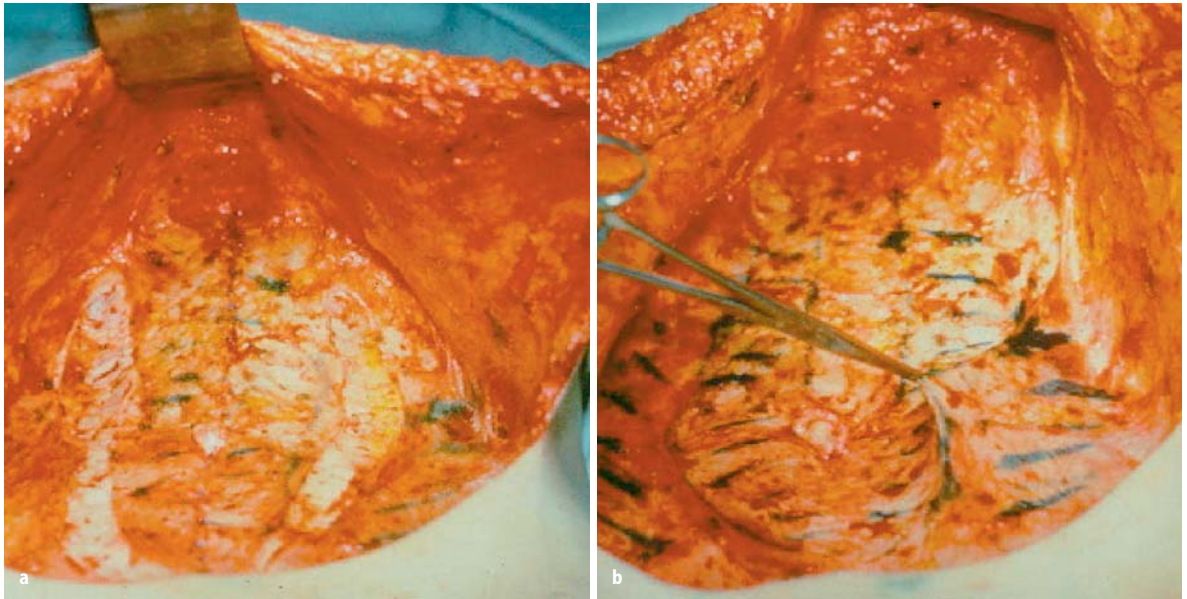


Fig. 8.8. **a** Intraoperative photograph of incision of external oblique aponeurosis. **b** Intraoperative photograph of advancement of external oblique aponeurosis



Fig. 8.9. The superior skin flap is pulled down and excised at the level of the inferior skin edge

temporarily opposed with staples, the new skin site of the umbilicus is marked in the midline at least 10 cm away from the skin edge but overlying the plicated umbilicus. A chevron incision, slightly wider than the diameter of the umbilicus, is made in the skin (Fig. 8.11). Selective defatting provides a natural periumbilical depression with mild hooding superiorly. The tip of the chevron is inset into an incision at the 6 o'clock radian of the umbilicus to break up circumferential cicatrice

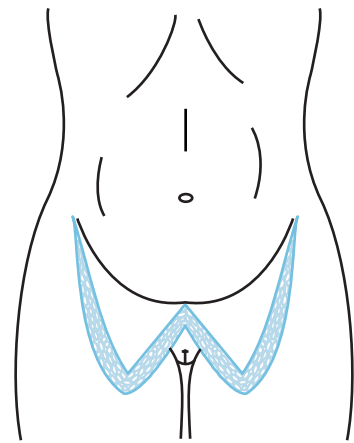


Fig. 8.10. Downward traction on superior skin flap

and provide a natural form of the inferior edge of the umbilicus (Fig. 8.11). A technical maneuver to facilitate exteriorizing the umbilicus is to place three triangulating 3-0 nylon sutures into the skin edges of the umbilicus and pass through the new skin site to be sutured to the new umbilical site skin edges after the abdominal flaps are approximated. Further 5-0 nylon sutures are placed in the inset umbilicus to prevent dehiscence of the umbilicus away from the skin edge. Two flat multi-perforated drains are placed beneath the abdominal flap exiting in the pubic skin. The superior and inferior abdominal flap edges are approximated from lateral to medial to decrease dog-ear formation. Scarpas fascia is approximated. Absorbable monofilament 3-0 sutures are placed in the deep dermis and a fine skin closure is

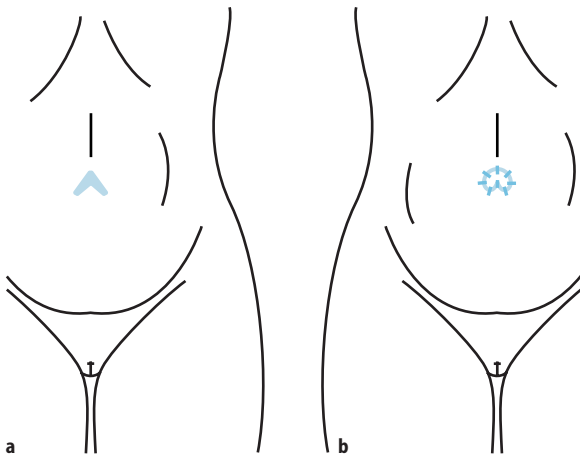


Fig. 8.11. **a** Umbilicoplasty. A chevron incision is made at the new skin site for the umbilicus. **b** The tip of the chevron is inset into the umbilicus

done. The umbilicus is packed with Xeroform gauze. Xeroform strips, ABDs and a crisscrossed splinting tape dressing are placed followed by an elastic girdle.

8.7 Postoperative Care

The patient is transferred to a bed maintaining a flexed position with the knees elevated. Fluid replacement is administered as necessary. Perioperative prophylactic antibiotics are continued. The patient is mobilized to ambulation as early as possible and until that time

compression stockings are continued. Coughing and deep breathing precautions are advised. Liquid diet is begun then advanced as soon as GI functioning is evident. The Jackson-Pratt drains are left in place until less than 30 cc of drainage per 24 h and there is no evidence of fluid collection. The drains are usually left in between 5 and 7 days. The patient is encouraged to stand erect within 1 week. The elastic garment is worn for 2 weeks (Figs. 8.12, 8.13).

8.8 Complications

The most frequent complication of the standard abdominoplasty is the formation of serosanguineous collections. This is mainly a direct consequence of the extensive undermining that occurs during the operation. Adequate placement of drains and leaving them in place until the drainage decreases to less than 30 cc/day is recommended. Elastic compression garments and fibrin glue have also been used to prevent this problem. If seromas occur after drain removal, careful needle aspiration may be a necessary alternative to the opening and placing of another drain. Other potential complications seen with this procedure are cellulitis, wound infection, widened scars, keloid formation, suture reactions, partial skin loss, wound dehiscence, contour irregularities, pulmonary complications, and pulmonary embolism. Infection rates vary from 1 to 2% in most series but may be increased when there is immune compromise such as in the patient with diabetes mellitus.



Fig. 8.12. **a** Preoperative frontal view; **b** postoperative frontal view

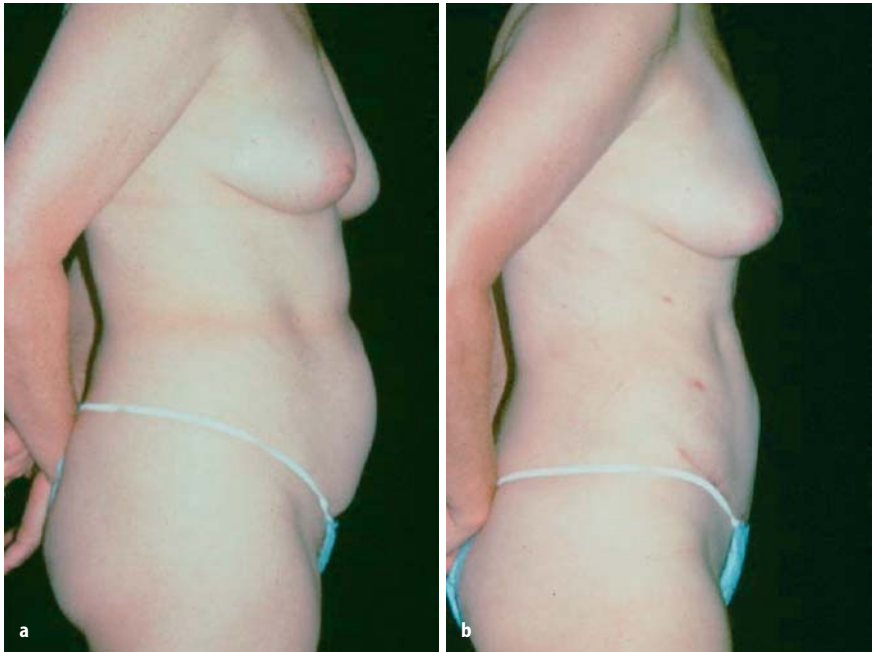


Fig. 8.13. **a** Reoperative lateral view; **b** postoperative lateral view

Widened scars are directly proportionate to the tension applied on the wound. Keloids may be anticipated in some types of highly pigmented skin. Keloid formation may be decreased by a gentle handling of the skin edges. Erythematous raised hypertrophic scars may be improved with laser therapy. Cortisone injections may be helpful in the more problematic scars.

Areas of partial skin loss and wound dehiscence may occur as a result of impairment of blood supply to the anterior abdominal skin. This is noted at a higher rate in patients who are smokers and diabetics. Typically, the management of the skin necrosis is managed conservatively until the blood supply to the abdominal skin flaps stabilizes and then a revision of either excision and reclosure or scar revision is done.

Pulmonary complications are the most worrisome sequelae of this operation. Tightening of individual components of the abdominal wall compresses the abdominal cavity and may limit diaphragmatic excursion particularly in the patient who has increased intra-abdominal fat.

Pulmonary embolism is a rare but life threatening complication of abdominoplasty. A high level of suspicion should be maintained with any patient who has pulmonary compromise or symptoms of shortness of breath or chest pain in the postoperative period. Diagnosis of a pulmonary embolism is facilitated by the gold standard of pulmonary angiogram or more recently with spiral CT scans. Reported documentation is obtained by lower extremity ultrasound studies. Evaluation and treatment of this potential complication should be aggressively pursued. The prevention of deep

venous thrombosis and pulmonary embolism employs heparin 5,000 units subcutaneous preoperatively as well as the use of pneumatic compression devices and early mobilization [9].

Pulmonary insufficiency as a result of tightening of the abdominal wall is a recognized complication of full abdominoplasty. It is the practice in patients with a high risk for pulmonary complications to recommend a more limited operation or consider other options.

8.9 Abdominal Scars

The presence of abdominal scars necessitates careful design of the skin incisions and rethinking of the choice of operative procedure. Infraumbilical scars such as those resulting from appendectomy, herniorrhaphy, hysterectomy, cesarean section, endoscopy portals, or colectomy incisions are usually resected with the dermatolipectomy specimen. Supraumbilical incisions such as subcostal incisions for cholecystectomy, chevron type incisions and Mercedes type incisions pose a greater risk for superior skin flap survival. In these cases a limited skin undermining should be chosen to preserve adequate perforating vessels to the skin flap below the transverse incisions.

The presence of a longitudinal midline scar and low transverse scar may allow resection of the skin in a subcutaneous flap in the vertical and horizontal dimensions but care should be taken not to overresect in these regions as closure may be difficult.

8.10 Combining Standard Abdominoplasty with Other Intra-abdominal Procedures

It is often desirable for female patients to combine abdominoplasty with an abdominal hysterectomy. A significant increase of complications with combined procedures has not been found; however, the literature indicates some slight increase in wound infections. This potential should be discussed with the patient.

8.11 Conclusions

Standard abdominoplasty is selected for the patient with excessive, loose, sagging, abdominal skin, lax abdominal muscular fascial wall and/or diastasis recti. Preoperative evaluation allows for appropriate selection of the patient that may require this procedure. Preoperative skin markings in the upright position facilitate an aesthetic result and symmetrical skin resection. The basic abdominoplasty follows a routine procedure: skin undermining, abdominal wall plication, excess skin resection, lipectomy, umbilicoplasty, and final closure with resection of dog-ears. It is necessary that the skin flap blood supply is preserved as described to prevent skin flap necrosis. Postoperative care is aimed at preventing seroma accumulation.

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