

6 Abdominolipoplasty: Classification and Patient Selection

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6.1 Background

By the late 1970s, abdominoplasty techniques evolved into a standardized procedure involving uniform treatment of the soft tissue layers and moving from combined vertical and horizontal incisions to one form of a low transverse incision. The introduction in the 1980s of suction assisted lipectomy (SAL) added a new dimension to abdominal contour surgery. Liposuction procedures alone or in combination with abdominoplasty allowed more patients with a wider variety of abdominal contour deformities to be successfully treated. From these concepts evolved the abdominolipoplasty classification system, a logical method to define and then treat abdominal contour deformities [1–3]. Further refinement of these techniques occurred in the 1990s when new concepts for minimal access procedures were developed with advances in liposuction and endoscopy [4].

6.2 Patient Diagnosis and Selection

Acquired abdominal contour deformities can be the result of weight gain or fluctuations, aging, pregnancy,

hormones, medications, lifestyle, and previous surgical incisions. Surgical correction is recommended for patients concerned about their abdominal contour when diet and exercise do not help.

The goals of surgery include: removing excess loose skin, decreasing the subcutaneous fat content, and tightening the underlying musculofascial system employing the least conspicuous incision. In discussing abdominal contour corrections with patients, the goals have to be clearly defined. A flatter abdomen is important and this will certainly depend upon the patient's underlying soft tissue and bony architecture. Lower abdominal bulges can result from the tendency for fat accumulation in the lower abdomen as well as from an absence of the posterior rectus sheath below the arcuate line of Douglas (Fig. 6.1). Intraperitoneal fat (visceral adipose tissue) is not treated by any abdominal contour procedure; it accumulates with age and is more likely to be found in men. Women also accumulate this type of fat as they approach menopause. Relaxation of the musculature and restraining ligaments, and skeletal abnormalities such as lumbar lordosis, should also be discussed and pointed out to the patient during the consultation since these conditions preclude achieving a flat contour. All these factors may detract from the overall appearance and successful outcome of abdomi-

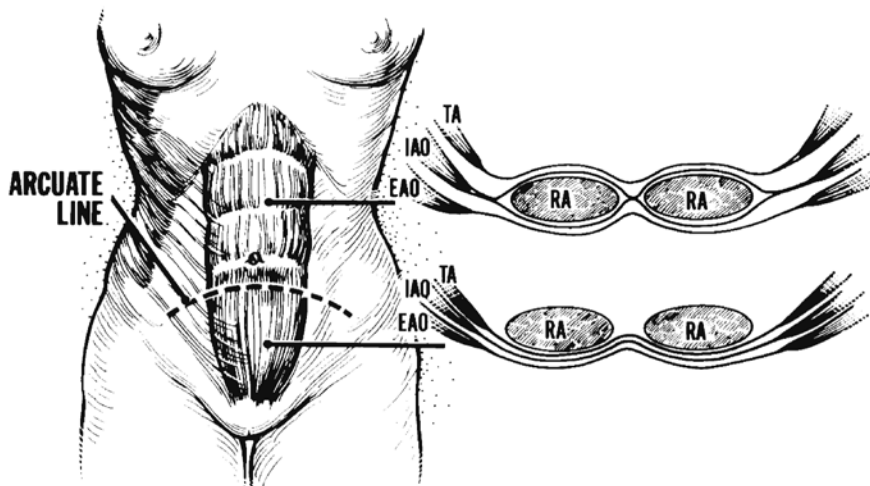


Fig. 6.1. Surgery anatomy of the anterior abdominal wall (TA, transversus abdominus; RA, rectus abdominus muscle; IAO, internal oblique muscle; EAO, external oblique aponeurosis) [1]

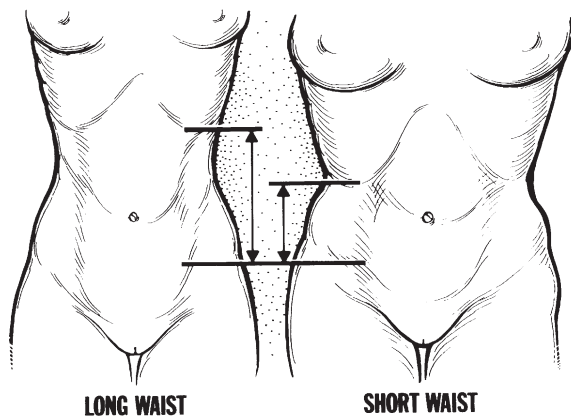


Fig. 6.2. Basic dimensions: short- versus long-waisted abdomen

nal contour surgery. As Greminger [5] has illustrated, the bony structure of the torso and pelvis determines the basic dimensions (“short” or “long” waisted) of the abdomen (Fig. 6.2). This leads to a general impression of the patient’s overall body habitus.

Examination of the patient is performed in the standing, sitting, supine, lateral, and lateral hip flexed (diver’s) positions to evaluate treatable areas of the skin, subcutaneous fat, and muscle layers. Differences in underlying anatomy including body proportions, bony architecture, umbilical variations, hernias, scars, and treatable soft tissue regions are noted. The skin quality, degree of subcutaneous fat accumulation, and extent of muscular diastasis or weakness are reviewed with the patient in front of a three-way mirror. Finally concerns of the patient regarding the extent of surgery including the tolerance of possible complications, recovery, and incisions all factor into the decision-making process.

After all these issues are considered, patients are then staged according to the abdominoplasty system of classification and treatment: Type 1, suction assisted lipectomy; Type 2, mini-abdominoplasty; Type 3, modified abdominoplasty; and Type 4, full abdominoplasty (Table 6.1). With the addition of minimally invasive techniques to the repertoire, subdivisions of the abdominoplasty classification system evolved allowing for smaller and fewer incisions. This includes: Type 1a, extended liposuction; Type 2a, open mini-abdominoplasty; and Type 3, endoscopically assisted or muscle access abdominoplasty (Table 6.2).

6.3 Contraindications

Abdominal contour surgery is contraindicated in those patients with unrealistic expectations and those with medical conditions that preclude surgery. Patients who are considering pregnancy in the future might want to consider delaying muscular plication or skin removal procedures [7, 8], although suction lipectomy can be performed. Smoking in general increases surgical risks and should be avoided completely.

6.4 Blood Supply of the Abdominal Wall

When combining abdominoplasty and SAL techniques it is important to have an understanding of the blood supply to the abdomen. Huger [9] evaluated the changes in the abdominal wall blood supply after full abdominoplasty and described three vascular zones. Zone I consists of the midabdomen and is mainly supplied by the deep epigastric arcade. Zone II consists of

Table 6.1. Abdominoplasty classification system

Category	Skin	Fat	Musculofascial system	Treatment
Type I	Minimal laxity	Variable	Minimal flaccidity	Suction-assisted lipectomy
Type II	Mild laxity	Variable	Mild lower abdominal flaccidity	Mini-abdominoplasty
Type II	Moderate laxity	Variable	Moderate lower and/or upper abdominal flaccidity	Modified abdominoplasty
Type IV	Severe laxity	Variable	Significant lower and/or upper abdominal flaccidity	Standard abdominoplasty with suction lipectomy

Table 6.2. Minimal access subtypes of the abdominoplasty system. Bold items distinguish these subtypes. Access abdominoplasty – abdominoplasty incision as approach to second operation

Category	Skin	Fat	Musculofascial system	Treatment
Type 1a	Minimum laxity	↑↑	Minimum flaccidity	Extended SAL
Type 2a	Mild laxity (vertical scar)	V	Mild lower abdominal flaccidity	“Open mini”
Type 3a	Minimum laxity	V	Lower/upper abdominal flaccidity	Endoscopic muscle access

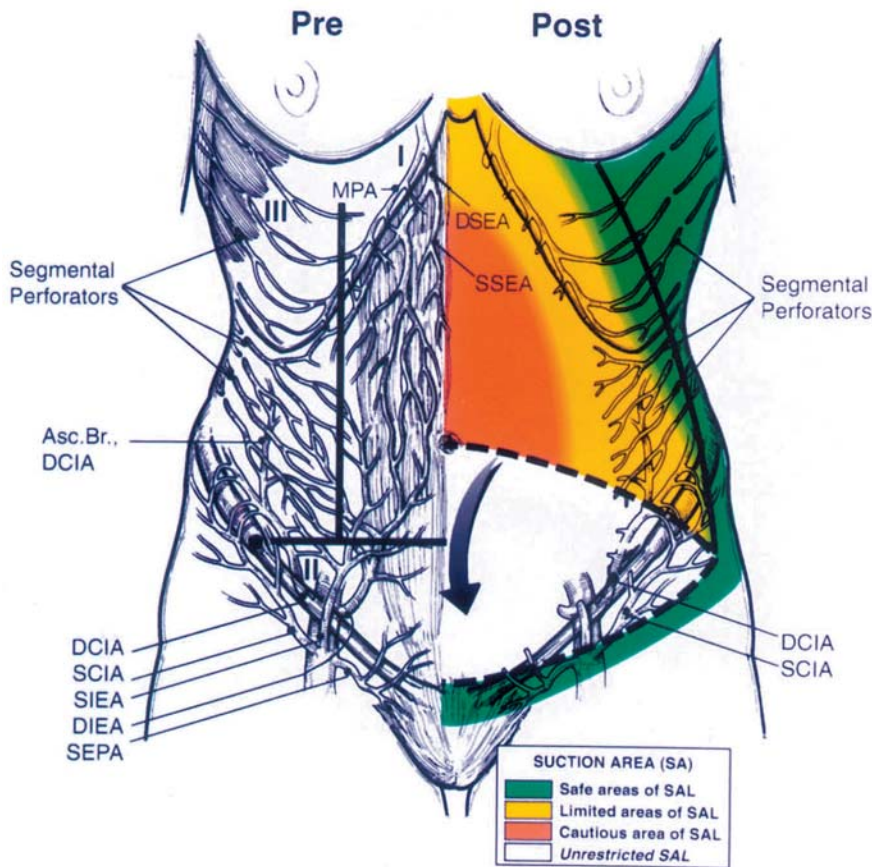


Fig. 6.3. Blood supply to the anterior abdominal wall. Note Huger zones I-III. Vascular anatomy and its relationship to potential areas of suction lipectomy (DSEA, deep superior epigastric artery; SSEA, superficial superior epigastric artery; MPA, marginal phrenic artery; DIEA, deep inferior epigastric artery; DCIA, deep circumflex iliac artery; SCIA, superficial circumflex iliac artery; SIEA, superficial inferior epigastric artery; SEPA, superficial external pudendal artery; segmental perforators (Zone III), intercostal, subcostal, and lumbar arteries) [10]

branches from the external iliac artery providing supply for the lower abdomen, and Zone III, which consists of the flanks and lateral abdomen, is supplied by the intercostal, subcostal, and lumbar arteries (Fig. 6.3).

The four regions most often suctioned are referred to as suction areas 1-4 (SA1-4) (Fig. 6.4). These areas are based upon the vascular anatomy and safety when combined with a full (type 4) abdominoplasty. Combining SAL with a full abdominoplasty may risk flap viability especially if SAL is performed in SA-3. This area is located in the middle of the undermined flap from the umbilicus to the pubis. The safest zone for suctioning after type 4 abdominoplasty is in SA-1 followed by suctioning in SA-2. SA-4 represents a theoretic area that is suctioned in type 1-3 abdominoplasty.

By understanding the vascular changes with abdominoplasty, SAL performed can be tailored so that maximal blood supply can be provided to the tissues and in turn will minimize the risk of complications. For type 1-3 abdominoplasty patients, the epigastric cascade in Zone I is preserved and therefore perfusion to the abdominal flap is reliable. Consideration should be given to a full abdominoplasty combined with liposuction because of the extensive undermining of surgery and the partial undermining of SAL. The new domi-

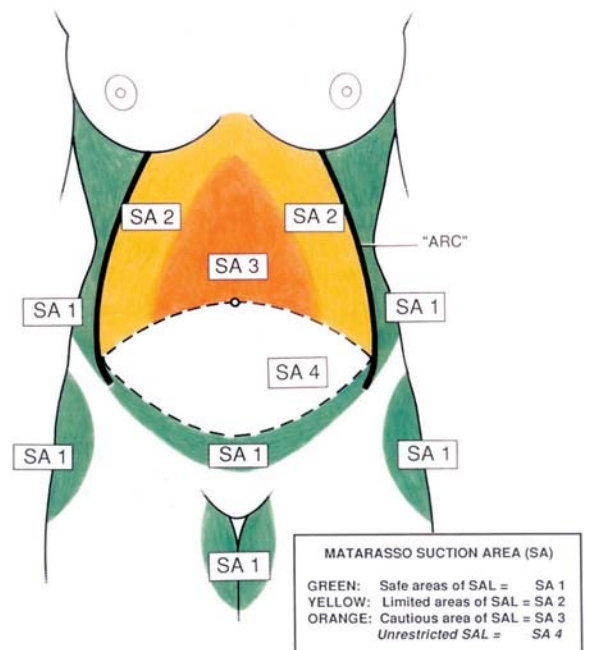


Fig. 6.4. The anatomic regions (suction areas) for suction lipectomy in abdominoplasty: SA3 (cautious), SA2 (limited), SA1 (safe), and SA4 (unrestricted) [10]

nant blood supply derives from the Zone III vessels and therefore suction of SA-3 is less reliable if suctioning is performed too vigorously. When extensive liposuction is necessary in a full abdominoplasty patient, staging the procedure or a panniculectomy with SAL should be considered as alternatives.

6.5 Preparation

Preoperatively, patients are instructed to avoid all medications that may induce bleeding as well as thrombogenic factors (i.e. female hormones). If they are smokers or use nicotine products, they are instructed to stop using these products several weeks prior to surgery and for at least 2 weeks postoperatively.

Patients are initially marked in a standing position to delineate the areas for liposuction and skin incisions for abdominoplasty. General or monitored intravenous sedation anesthesia administered by an anesthesiologist is preferred. A super-wet concentration of fluid (1

of Ringer's lactate, 20 cc of 1% lidocaine and 1 cc of 1:1,000 epinephrine) for subcutaneous infusion is infiltrated. If liposuction is performed it usually precedes the abdominoplasty procedure.

At the end of the procedure, an anatomic data sheet is completed as part of the patient's chart [11] (Fig. 6.5). This permanent medical record is useful when recalling procedures performed and helps in monitoring success of techniques.

6.6 Choice of Surgical Technique

6.6.1 Type 1: Suction-Assisted Lipectomy

The ideal candidate for isolated SAL is one with minimal skin laxity, varying degrees of subcutaneous fat accumulation, and little to no flaccidity of the musculo-fascial system. Once SAL is performed on isolated fat deposits, the resiliency of the skin leads to contraction and improvement in overall contour (Fig. 6.6) [12, 13].

Body Contour and SAL Data Sheet

	Name: _____		Date of Surgery: _____	
	Anes: L/A MIS G/A		Blood: _____	

BREASTS	L	R		
REDUCTION				
Measurements				
Volume	_____ cc	_____ cc		
Pedicel / graft				
AUGMENTATION				
Incision				
Implant type & vol	_____ cc	_____ cc		
Mastopexy				
Other				
ABDOMEN				
Type I, II, III, IV				
Rectus abd. muscle				
Umbilicus translocated / transposed				
SAL Abd	_____ cc			
SAL	L	R		
Love handles	_____ cc	_____ cc		
Thighs				
outer	_____ cc	_____ cc		
inner	_____ cc	_____ cc		
anterior	_____ cc	_____ cc		
Buttocks	_____ cc	_____ cc		
Knees	_____ cc	_____ cc		
Calves	_____ cc	_____ cc		
Ankles	_____ cc	_____ cc		
TOTAL	_____ cc	_____ cc		

Dermatolipectomy _____

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Fig. 6.5. The anatomic data sheet for body contour to be utilized for breast, abdomen, and extremity surgery. The accompanying checklist provides room for measurements, volumes, varying surgical techniques, and the type of implant used [11]

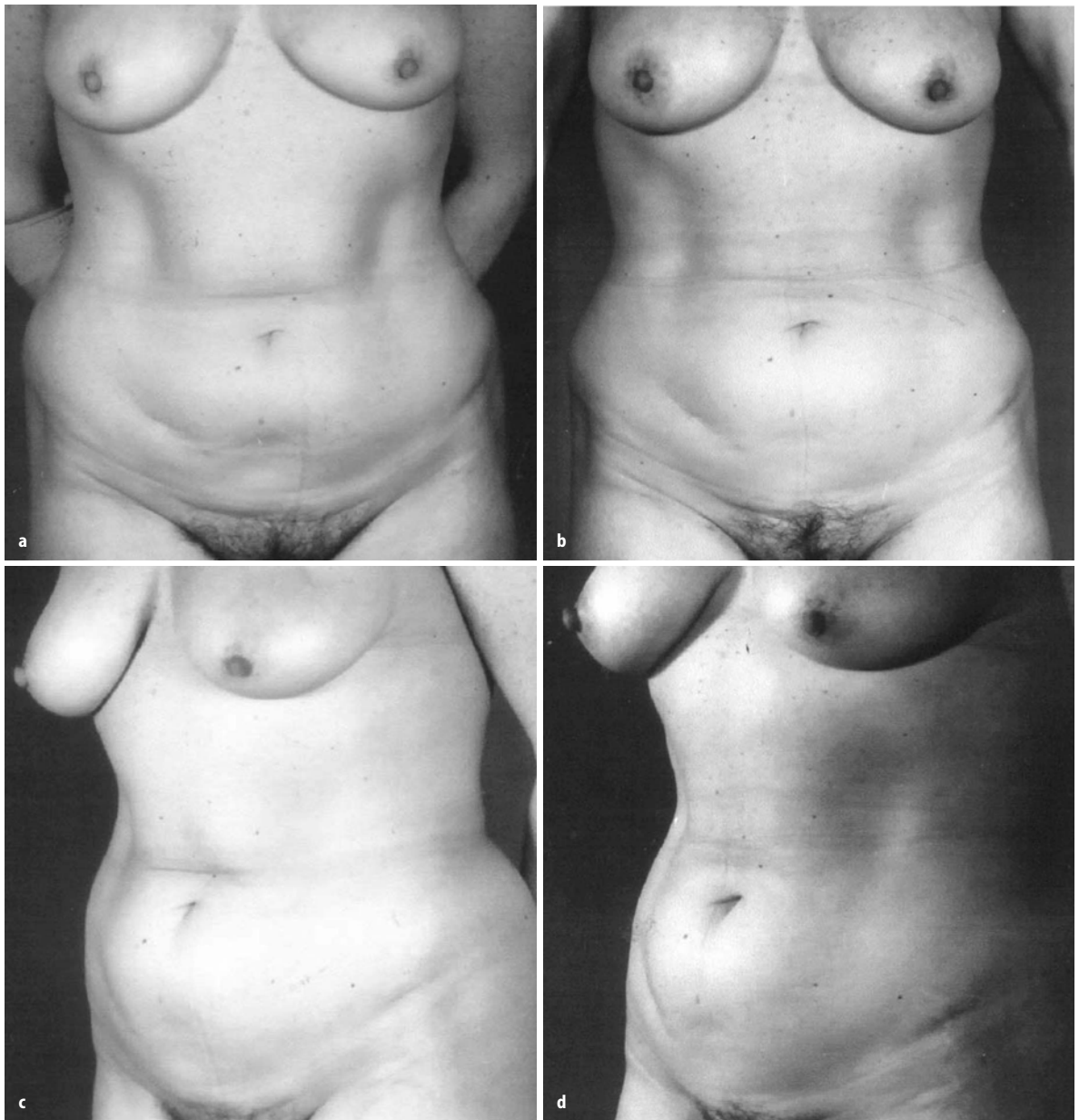


Fig. 6.6a–d. A 39-year-old, Type 1 patient 2 years following a 700-cc suction lipectomy of the abdomen. **a, c** Preoperative; **b, d** postoperative

SAL is often used as the initial surgical approach in all four categories of abdominoplasty procedures (Fig. 6.7).

6.6.2 Limited Abdominoplasty

When combining SAL with traditional abdominoplasty techniques, an additional 25–30% of the patient population can benefit. In those patients in whom SAL alone would not correct the deformities, but a full abdomino-

plasty is too extensive, then Type 2 (mini-abdominoplasty) and Type 3 (modified abdominoplasty) are considered. While the techniques are similar, the presence of the umbilicus necessitates an additional category of treatment. Type 2, the mini-abdominoplasty, focuses on the lower abdominal musculofascial system, whereas the Type 3, modified abdominoplasty, allows for flexibility in treating the upper abdominal musculofascial system as well and excess skin in patients who are not candidates for a full abdominoplasty.

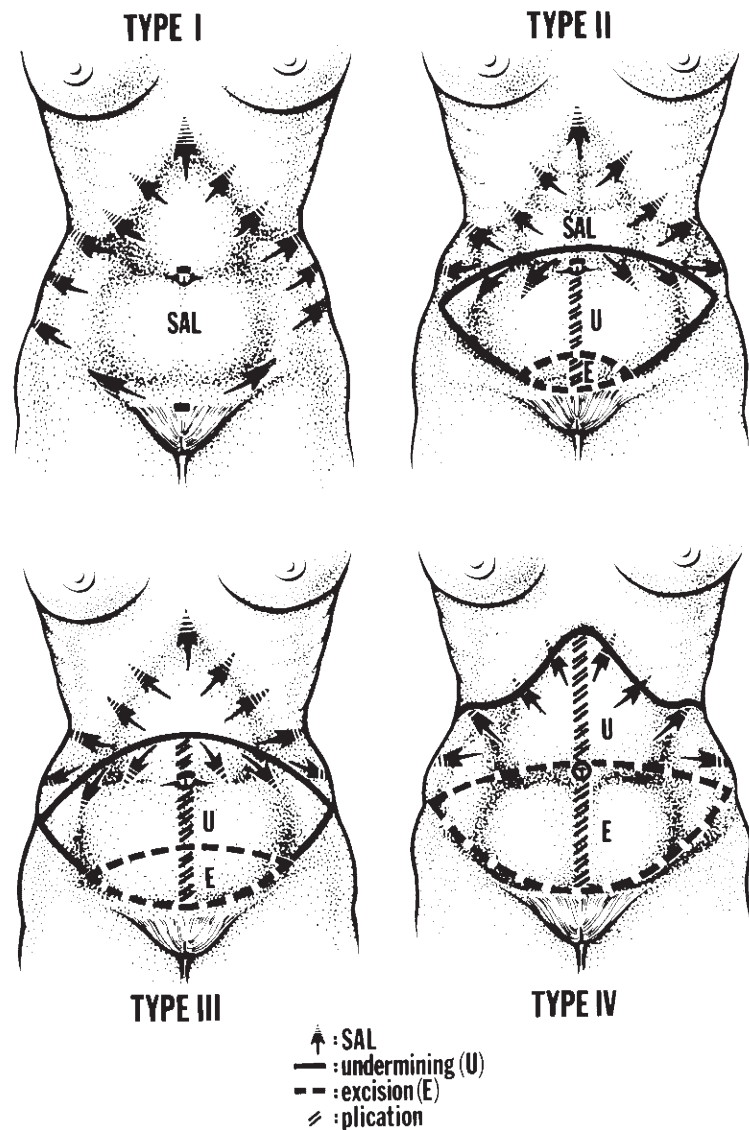


Fig. 6.7. Abdominoplasty types

6.6.3

Type 2: Mini-abdominoplasty

The ideal candidate for a mini-abdominoplasty is one with distortion limited to the caudal abdomen between the umbilicus and pubis. Patients best suited for Type 2 treatment require correction of a combination of minimal excess skin, variable amounts of subcutaneous fat, and relaxation of the lower abdominal musculofascial [14]. The bulge that is evident is primarily due to musculofascial flaccidity; therefore, SAL alone does not correct the deformity. Rather, these patients benefit from closure of the muscular diastasis. Observing the diver's view is often the best way to differentiate between Type 1 and Type 2 patients.

Liposuction is usually the first step in this procedure

as is the case for Type 3 and Type 4. A curvilinear incision measuring approximately 5–10 cm is made in a premarked horizontal ellipse of skin adjacent to the pubic hairline. Occasionally Type 2 patients do not require fat removal or skin excision, and the exposure is solely for access to the musculofascial system.

The pre-marked area of skin excess is excised. The flap is then elevated at the anterior rectus fascial plane to the level of the umbilicus. Laxity of the rectus musculoaponeurotic system is evaluated and then vertically plicated with buried figure-of-eight 2–0 Neurolon sutures. The operating room table is slightly flexed, and the abdominal flap is secured with a 3–0 nonabsorbable suture to the lower incision. Closed-system suction drains are placed through the wound or pubic es-

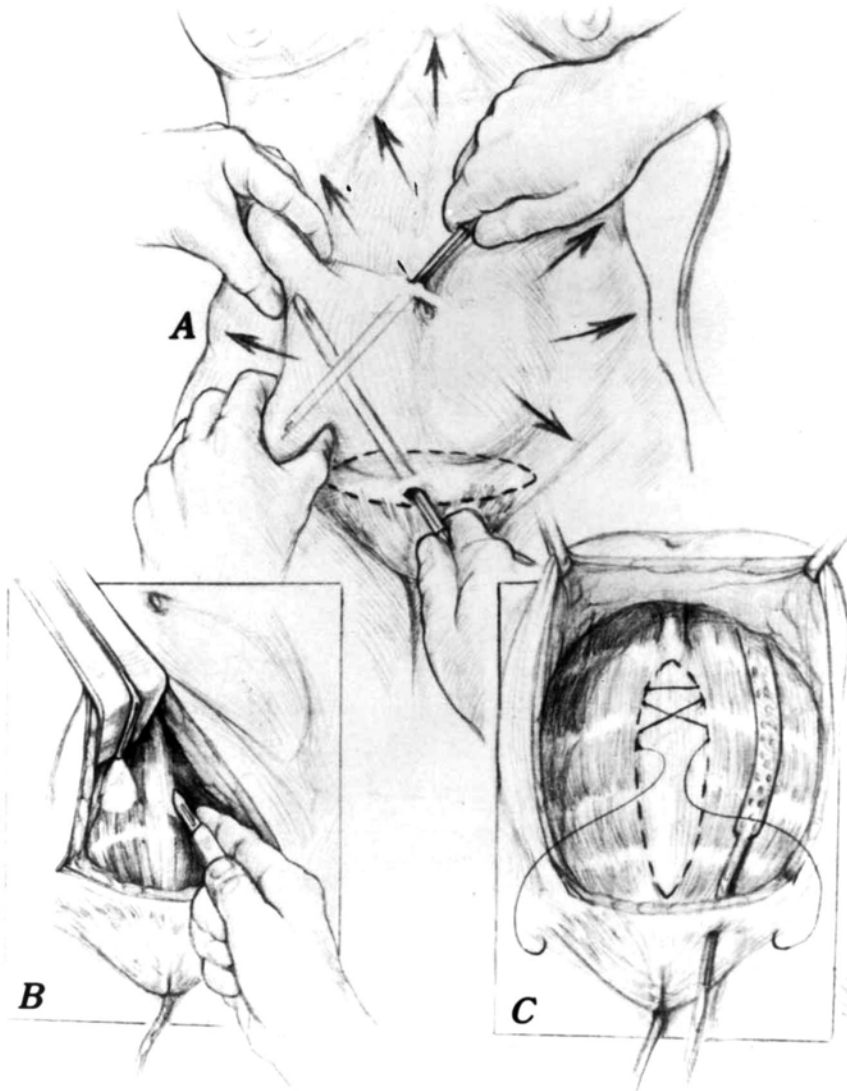


Fig. 6.8A–C. Surgical technique in a type 2, mini-abdominoplasty patient. **A** Surgery begins with liposuction over the aesthetic unit of the abdomen. Incisions can be altered to the patient's preference. **B** Flap is elevated to the level of the umbilicus with the aid of a lighted fiberoptic retractor. **C** The anterior muscle layer is reinforced vertically and occasionally horizontally. The flap is trimmed and closed over drains

cutcheon. The wound is closed from lateral to medial in layers with Vicryl, Prolene, and nylon sutures with a nonadherent gauze dressing. “Dog-ears” or discrepancies between the upper and lower flaps are treated secondarily (Fig. 6.8).

At the end of the procedure, the patient is transferred to a stretcher or bed and an elastic compressive binder is applied and worn continuously for at least 2 weeks. The patient is encouraged to be in a sitting position the night after surgery with progressive ambulation in a flexed position. The drains are removed when the drainage has subsided. Full activity is resumed in 2–3 weeks after surgery (Fig. 6.9).

6.6.4

Type 3: Modified Abdominoplasty

A patient who is a candidate for a Type 3 abdominoplasty presents with excess skin particularly above the umbilicus and flaccidity of the musculofascial system that extends from the pubis to above the umbilicus. This procedure also applies to a patient who in performing a full abdominoplasty would not be able to have removed the entire portion of skin encompassing the old umbilical site, thus necessitating an undesirable vertical slit closure. Additionally, general contraindications or abdominal scars that limit the extent of the safe upper abdominal flap undermining routinely in a full abdominoplasty are candidates as well (Fig. 6.10) [15].

A curvilinear incision is marked preoperatively in a natural skin fold with the patient in a lateral hip-flexed

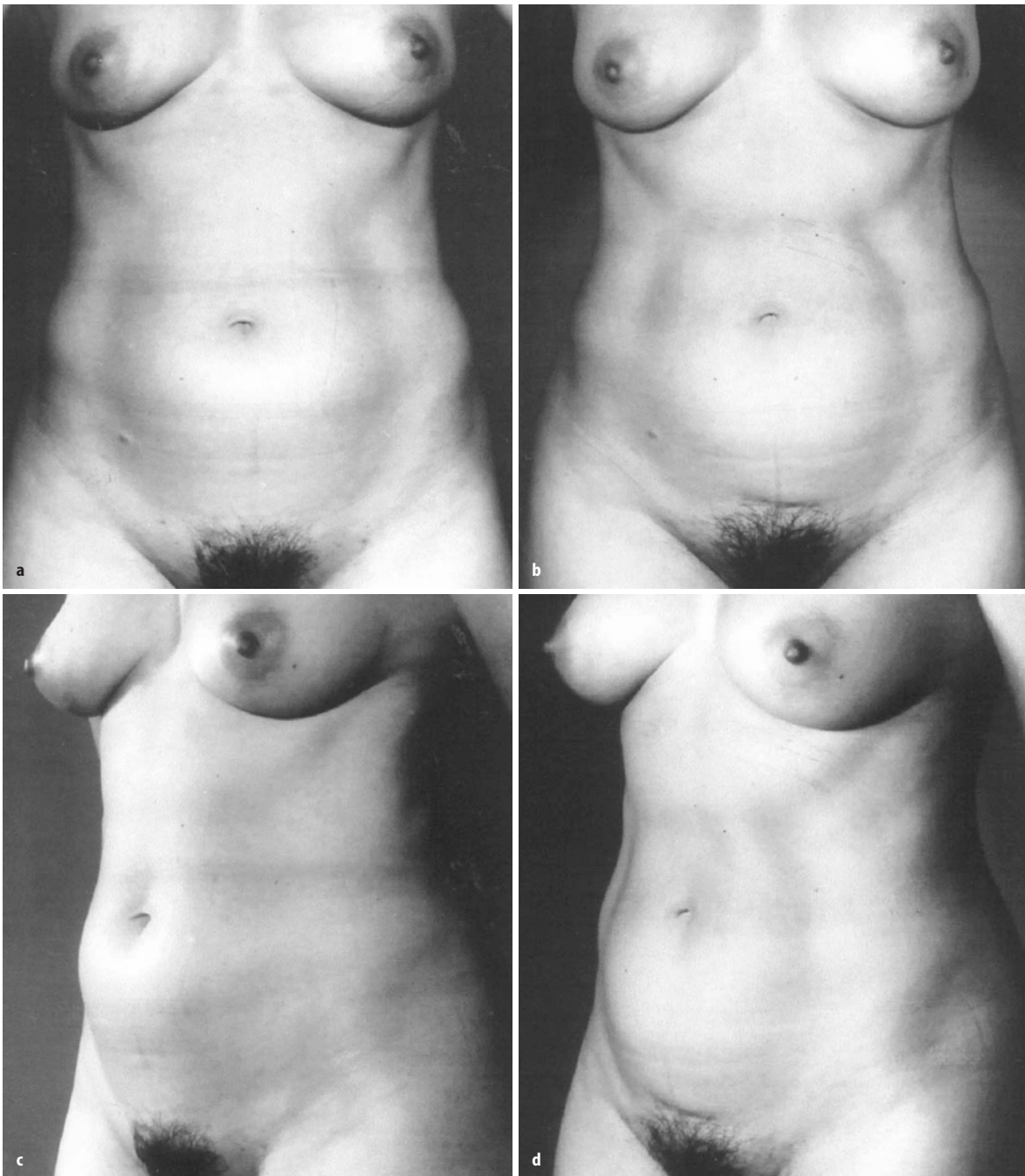


Fig. 6.9a–f. A 52-year-old Type 2 patient who had a mini-abdominoplasty with 600 cc of suction lipectomy. **a, c, e** Preoperative; **b, d, f** postoperative

position. The length of the incision is longer than that of a mini-abdominoplasty but confined within the anterior superior iliac spines. Brief undergarments may aid in adjusting skin excision within the boundaries of the garments.

Liposuction as in Type 2 is the first step. The flap is then elevated at the level of the anterior rectus fascial plane and undermined beyond the level of the umbili-

cus, which is beyond the extent of undermining in Type 2. The musculoaponeurotic fascia is then plicated. This plication can be extended above the umbilicus with an intact stalk by distracting the stalk inferiorly with a Penrose drain. Horizontal sutures for waistline narrowing can also be placed [16].

In long-waisted individuals, the umbilicus may be transected and floated downward. This maneuver is

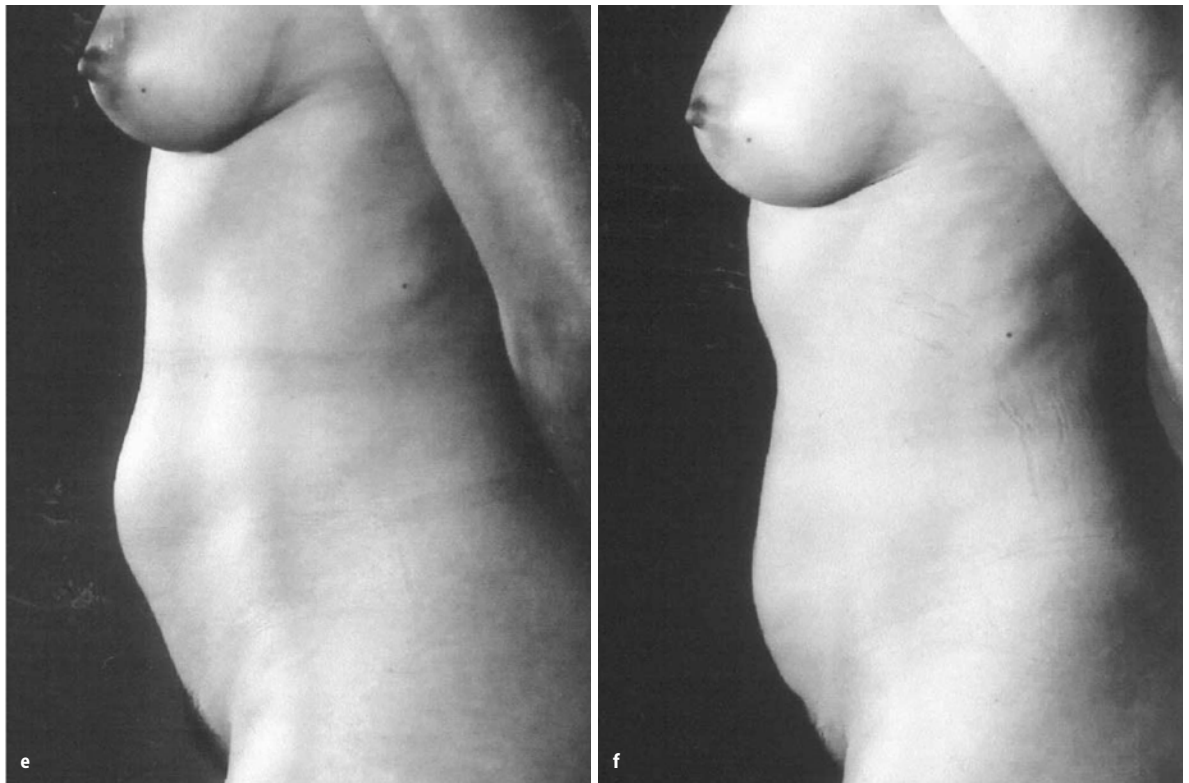


Fig. 6.9a–f (Cont.)



Fig. 6.10a–d. A 49-year-old, Type 3 female patient with a heavy smoking history who underwent a modified abdominoplasty and bilateral mastopexy with augmentation. **a, c** Preoperative; **b, d** postoperative

helpful in patients with excess skin in the periumbilical region and the upper abdomen. It is important prior to transecting the umbilicus that the area is palpated for hernias. After placing the umbilicus on maximal stretch the umbilicus is divided at its entry point into the rec-

tus sheath. Once divided the entry point is then closed with a buried figure-of-eight suture. The umbilicus is then carried inferiorly no more than 2–3 cm below its original position generally 10 cm or more from the pubic hairline. After the rectus sheath is plicated, the um-

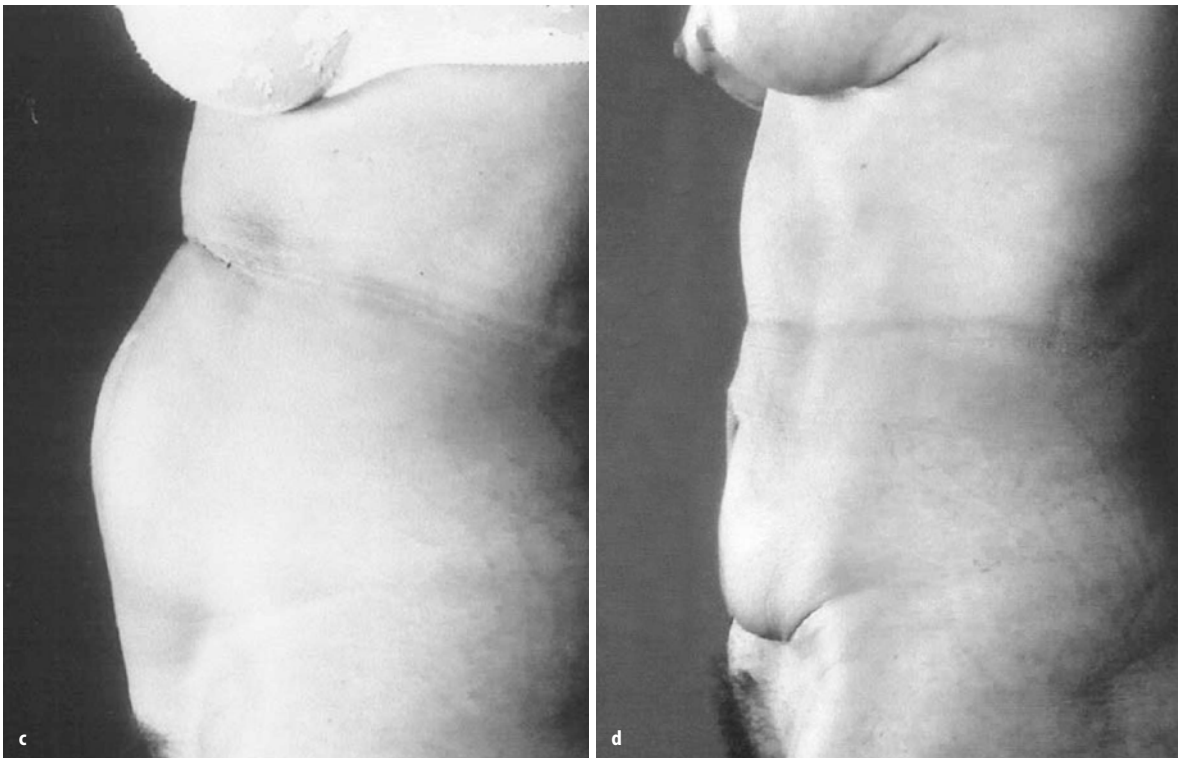


Fig. 6.10a–d (Cont.)

bilicus is reinserted to a level slightly higher than where it lies naturally using a 4–0 nylon to create an aesthetically pleasing downward pull and superior hooding.

The operating table is flexed to approximately 30 degrees and the flap is advanced inferiomedially. The excess skin is then measured, marked, and excised. Contour differences between the upper and lower flaps are equilibrated and the wound is closed in layers over closed-system suction drains. Postoperative care is similar to those having Type 2 procedures (Fig. 6.11).

6.6.5

Type 4: Full Abdominoplasty with Suction-Assisted Lipectomy

A patient with severe skin laxity and significant upper and lower abdominal musculoaponeurotic flaccidity is the ideal candidate for a Type 4 procedure. Grasping the skin from the umbilicus to pubis in this patient reveals the ease with which it can be excised. Consideration must be given to each stage of the procedure:

1. The need for SAL of the upper abdominal flap
2. Design of the incision and amount of skin resection
3. Flap elevation
4. Rectus musculoaponeurotic plication
5. Treatment of the umbilicus
6. Closure and final tailoring

The patient is marked in a standing position while wearing a preferred undergarment. Most commonly, an open W-incision [17], modified gull-wing incision [18], or a bicycle handle incision [19] has the advantage of exerting tension laterally preventing upward migration of the pubic escutcheon where vascularity is usually poorest. In addition, an incision in a natural skin crease is acceptable provided it is low enough to account for tension and unraveling of the flap. Furthermore, the incision should avoid crossing the inguinal creases.

The operating table is checked to insure that it can be maximally flexed prior to induction of anesthesia. Again, as in the other procedures described, liposuction is performed first, in areas 1–3 (Fig. 6.4). Surgery proceeds with circumscribing of the umbilical stalk. The abdominal flap can be treated in one of the following ways: (1) by removing the ellipse of skin from umbilicus to pubis; (2) by incising the lower margin in a classic fashion, undermining the flap, plicating the rectus fascia, flexing the table, and then removing the excess skin; or (3) by incising the upper margin, undermining the flap, advancing it inferiorly, then marking the lower incision in a vest-over-pants approach [21].

The abdominal pannus is elevated at the level of the rectus sheath usually to the xyphoid and costal margins; however, this may vary based upon the patient's needs. Most importantly, the flap should be elevated

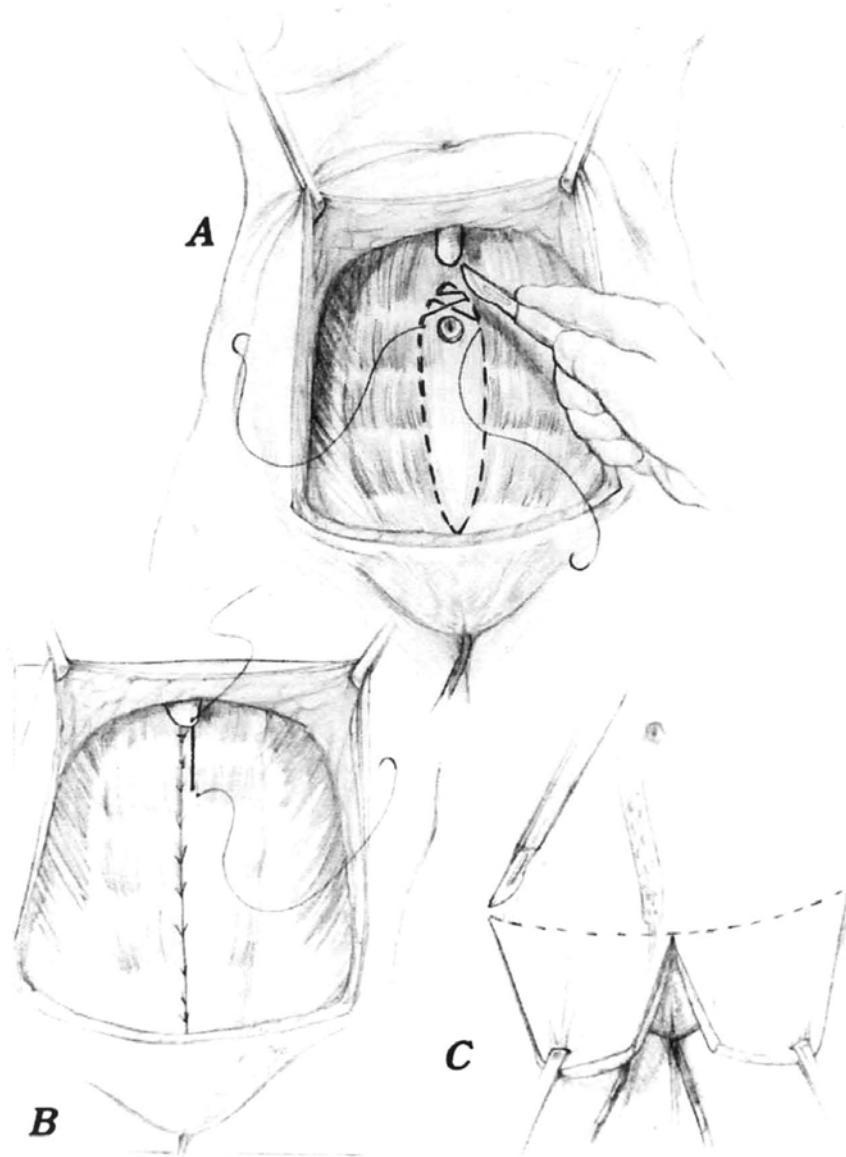


Fig. 6.11A-C. Type 3 modified abdominoplasty. **A** Longer incision is demarcated after performing liposuction. The umbilicus, which has a dual blood supply, can be left intact or detached at its base. **B** Musculoaponeurotic plication is then performed to the extent indicated. If the umbilicus is detached, it is reinserted. **C** Final flap tailoring is done with the patient flexed. Wound edges are pulled in the inferomedial direction

superiorly in an inverted “V” type fashion and laterally only to the extent necessary to achieve wound closure without tension. The patient then undergoes plication of the rectus muscle and any other plication that is necessary (e.g., waistline of external oblique tightening). The patient is flexed and the flap is advanced. After closed suction drains are placed and brought out through the wound, the excess skin is then excised and secured to the midline of the lower flap and closed in layers as in Type 2 and 3. When the lateral margins are closed, they are advanced medially to minimize any dog-ears. Minor discrepancies of flap thickness between the upper and lower wound margins can be treated at this time with liposuction. Sometimes scar revisions are performed secondarily when there is less tension on the closure (Fig. 6.12).

The mons pubis is then often defatted and unfurled, and along with the lower flap is stabilized with absorbable sutures to inhibit upward scar migration [22]. Sometimes, the mons can be reduced by excising a vertical or horizontal ellipse to bring it into proportion with the new contour of the abdomen [23].

The umbilicus is transposed into a downward curved 2.0–2.5 cm incision. In the past, half-buried mattress 4–0 nylon sutures were placed in the 4, 6, and 8 o’clock positions. These sutures were passed through the skin of the flap incorporating the rectus fascia below and passing up through the umbilical skin. This practice is no longer routinely performed because on long-term follow-up it has very little impact on the final result. If utilized, it is done on thin patients only at the 6 o’clock position. Furthermore, if a tacking suture

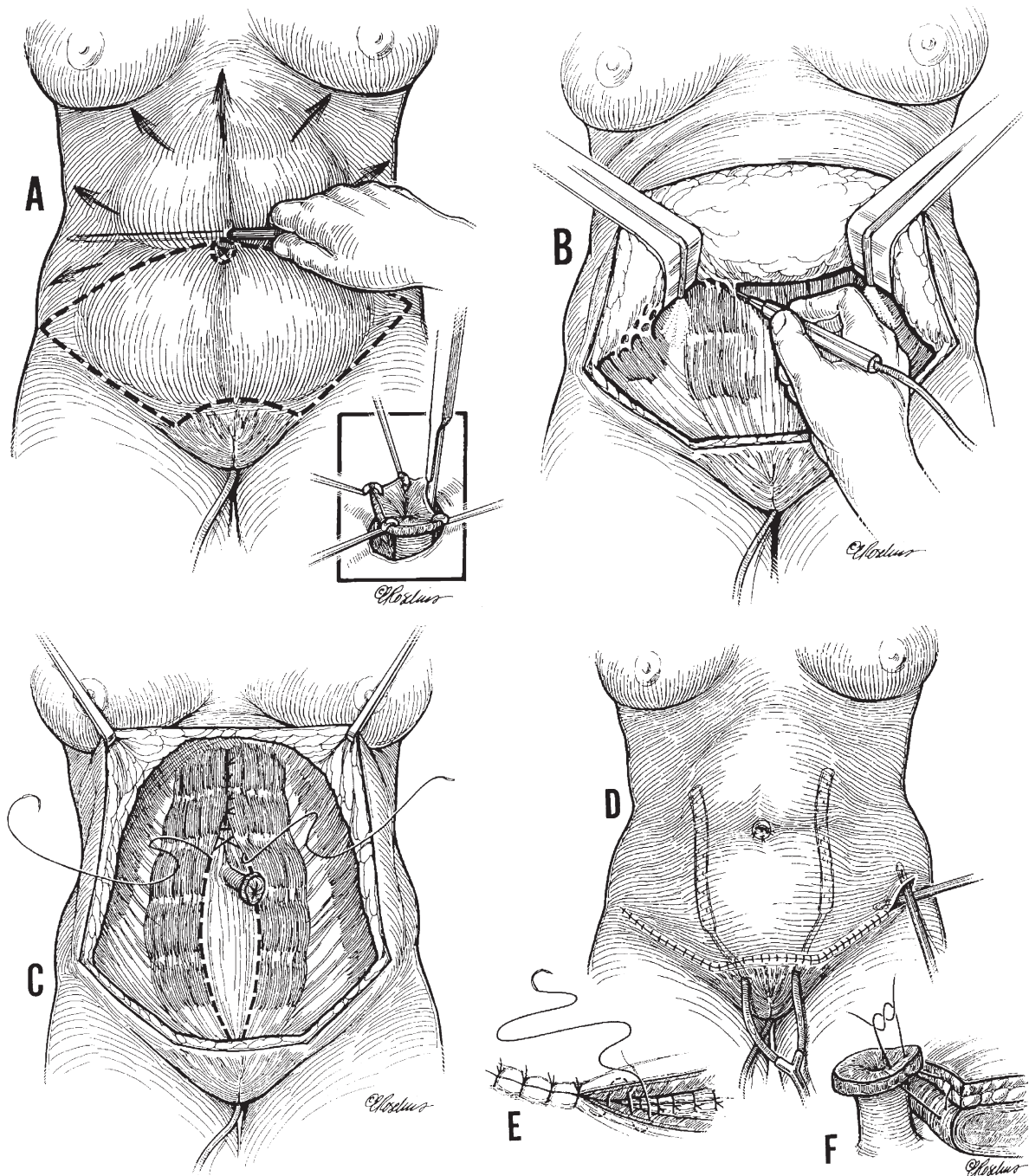


Fig. 6.12. Full abdominoplasty with concomitant SAL. **A** Surgery begins with liposuction, and proceeds with circumscribing the umbilicus. **B** Flap is then undermined only to the extent necessary to achieve wound closure without tension. **C** Muscular plication is performed according to the degree of laxity. **D, E** Patient in a flexed position with the wound closed over drains. Final tailoring can be done with liposuction. **F** Umbilicus is exteriorized and fascia sometimes is incorporated in the closure. The skin should be brought to the umbilicus after defatting the upper and lower margins [20]

pulls away from the fascia, it may distort the appearance of the umbilicus [23]. The umbilicus is closed using 4-0 nylon sutures from the umbilical skin and to the skin of the abdominal flap.

At the end of the procedure, the patient is transferred to their bed, which is flexed. Postoperative care is similar to that in Type 2 and 3. The patient progresses to full activity over a 3-4 week period (Fig. 6.13).

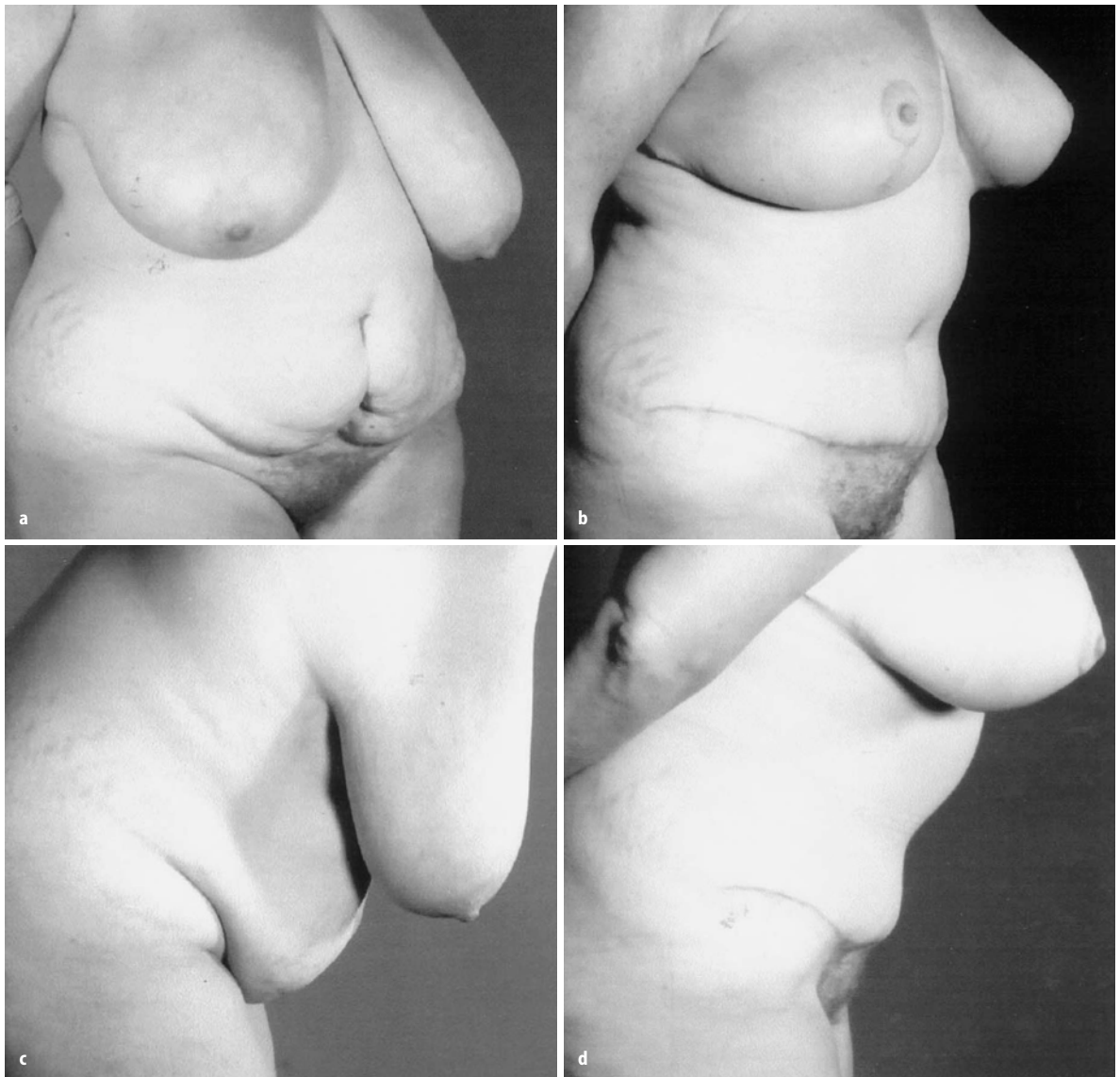


Fig. 6.13a–d. A 47-year-old, Type 4 abdominoplasty patient. Eight months after reduction mammoplasty, Type 4 abdominoplasty, with 700 cc of suction lipectomy. **a, c** Preoperative; **b, d** Postoperative

6.7 Minimal-Access Variations in Abdominoplasty

Although the majority of patients are treated according to the classification system previously described, there is a trend toward reduced intervention and minimal access, which has further subdivided these categories. These techniques increase the treatment options and result in smaller and fewer incisions (Fig. 6.14).

6.7.1 Type 1a: Extended Liposuction

This procedure is indicated in a patient who can be successfully treated by large volumes of fat removal without requiring skin removal or muscular plication. Patients who have “pseudoptotic” skin must be accurately distinguished from those with irreversibly stretched skin prior to undertaking extended liposuction. This approach takes into consideration treatment of multiple aesthetic units of the torso including the upper and lower abdomens, umbilicus, flanks, mons pubis, sacrum and/or back rolls (Fig. 6.15). It requires larger volumes of local anesthesia and more extensive lipo-

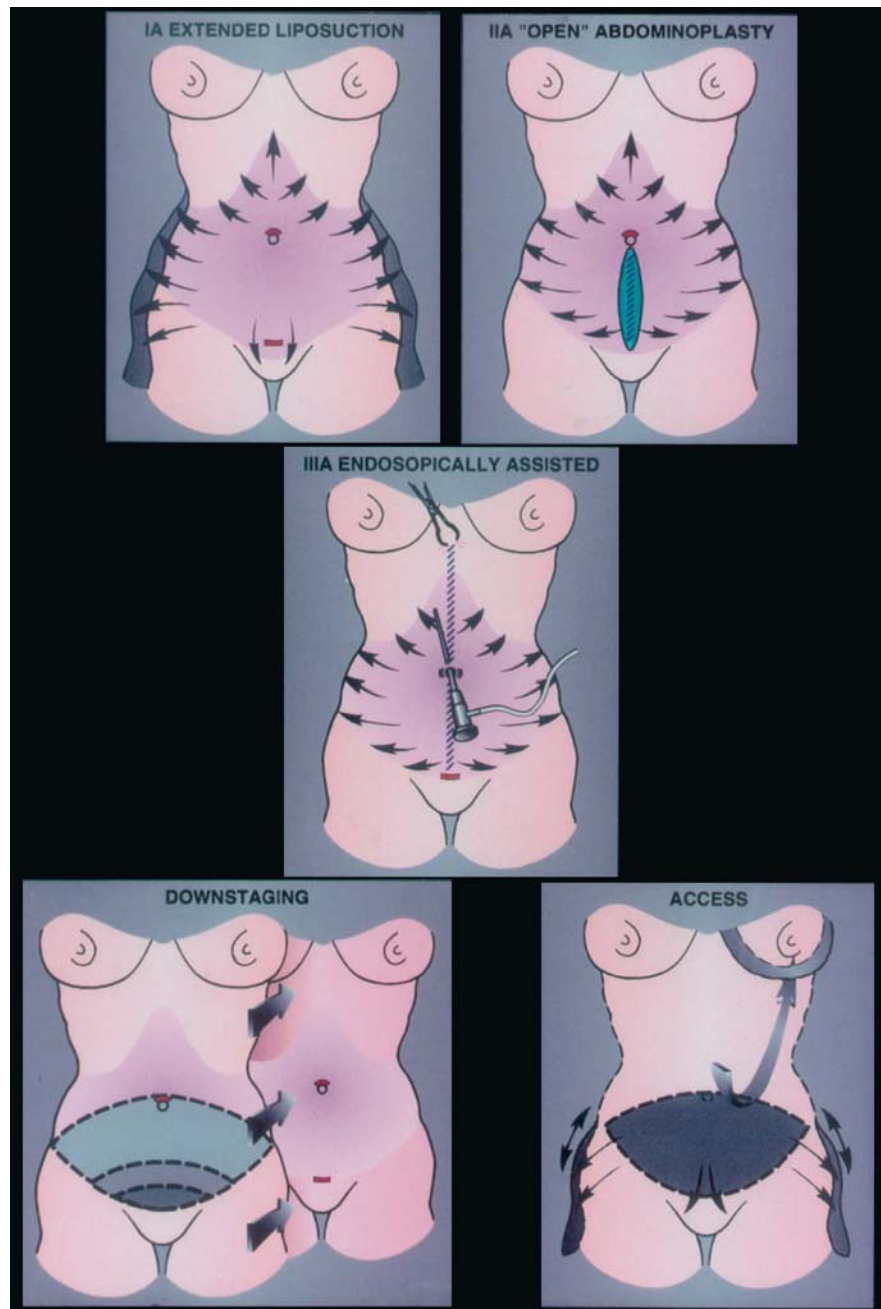


Fig. 6.14. Schematic of the subtypes. These minimal-access variations in abdominoplasty are related to the types of abdominoplasty from which they are derived: Type IA, extended liposuction; Type IIA, “open” mini-abdominoplasty; Type IIIA, endoscopically assisted or muscle access abdominoplasty. Downstaging procedures (from one type to a less invasive type of abdominoplasty) and the abdominoplasty incision for access related procedures (such as for adjacent liposuction) are also used [4]

suction than traditional limits. It can be used as an alternative to “open” approaches when an adequate result is anticipated. In contrast to liposuction ranging from 400 to 800 ml for the abdomen alone, extended liposuction usually exceeds 2,000 ml.

Surgery often begins in the prone or lateral decubitus position after super-wet infiltration of local anesthesia. Liposuction of the sacrum, flanks, and back rolls is performed in a “belt-like” fashion in the deep and superficial planes. The patient is then turned and placed in a supine position to treat the anterior abdo-

men. Suctioning of the mons and upper hips can also be treated at this time. The end point of suctioning is based on the potential for skin retraction as well as visual and tactile parameters.

If contour irregularities are appreciated, liposuction of adjacent areas may correct this discrepancy or a “squeezing” technique may be used to push adjacent fat into the depressed region. If these maneuvers are not successful, autologous fat injection into the depressed region may offer the solution.

At the conclusion of the procedure, the skin is then

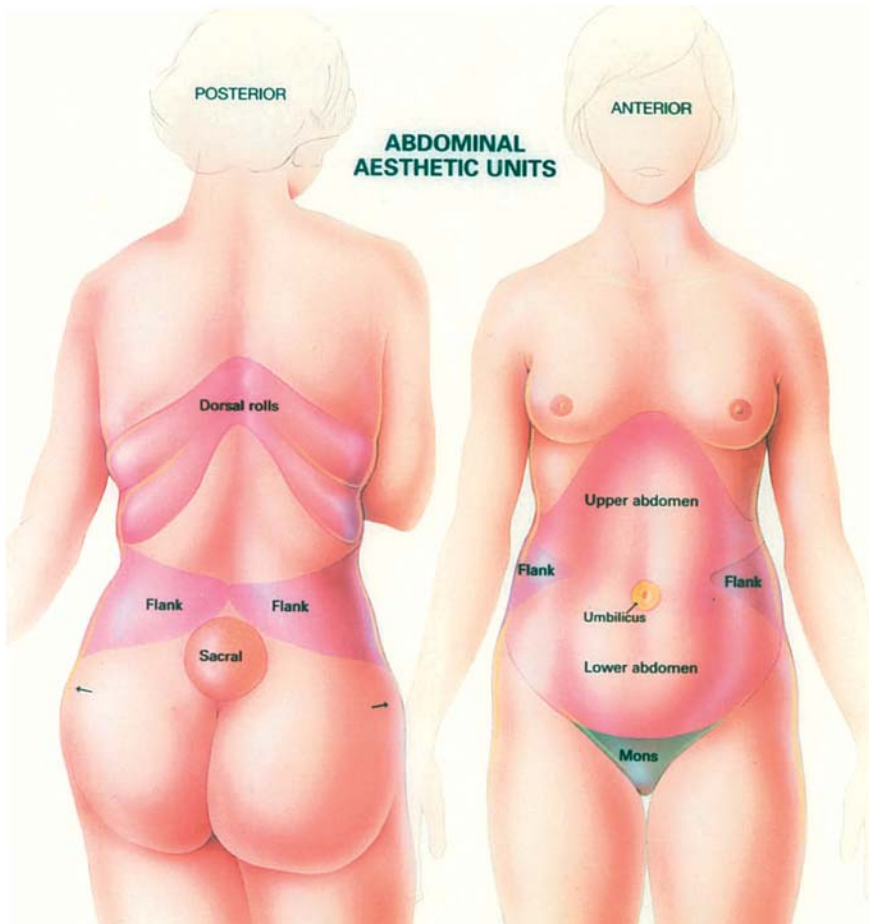


Fig. 6.15. The seven distinct circumferential aesthetic units of the female abdomen that should be addressed [6]

redraped and sometimes taped. Fluid is replaced as necessary and the suctioned sites are reinforced with binders as well as either Reston foam or towels between the garment and the skin. Postoperative care and recuperation is similar to those patients in Type 1 and 2 categories.

6.7.2

Type 2a: Open Mini-abdominoplasty

Indications for this procedure are for patients who are candidates for Type 2 but also have a midline vertical scar extending from the umbilicus to pubis. Vertical incision abdominoplasty is not new and has been described elsewhere [24, 25]. Type 2a patients have the deformity with mild skin laxity confined mainly to the lower half of the abdomen and relaxation of the musculoaponeurotic system limited to the region between the umbilicus and pubis as for patients in Type 2.

In the presence of a vertical scar it is essential as in all physical exams to rule out the existence of a hernia. The excess skin is estimated and marked for excision. Liposuction is again the first procedure performed if there is no evidence of a hernia. If a hernia is thought to be pre-

sent, careful excision of the skin flap is performed, and repair of the hernia follows. Liposuction can then be performed through the open wound. The excess skin around the scar to the level of the rectus fascia is removed with undermining. The fascia is then plicated with permanent sutures. A closed-suction drain is placed and the incision is closed in multiple layers. Again, postoperative care is similar to that for Type 2 patients.

6.7.3

Type 3a: Endoscopically Assisted or Muscle Access Abdominoplasty

The ideal candidate for this procedure is a patient with minimal skin excess and upper and lower muscular flaccidity that can be addressed by fiberoptic and endoscopic instruments. The utility of this procedure is limited because often these patients have excess skin that must be removed. Moreover, the instrumentation has not been developed adequately for the sophistication necessary.

Surgery begins with liposuction, as necessary. Exposure for the endoscopic repair of the muscle is then ob-

tained via a pubic and peri- or transumbilical incision. A wide optical cavity is developed and the upper abdominal skin is retracted with towel clips externally. A 10-mm, 30-degree downangled endoscope is then inserted. A loop or endoscopic suture punch is used for the rectus fascia plication [25].

After the rectus fascia is repaired, any skin bunching can be freed by undermining to avoid a permanent irregularity. Closed-system suction drains are placed and garments and taping similar to Type 1a are used.

6.8 Additional Options for Smaller or Fewer Incisions

6.8.1 Downstaging

Downstaging to a less extensive procedure is made at the time of consultation. This may occur as a result of individual risk factors precluding a more involved procedure, or specific patient preference. Patients who have comorbid medical conditions, smoke, or have abdominal scars that may increase the risk of potential complications, or the inability of patient to tolerate more scarring or a more involved recovery period may find it prudent to downstage to a less invasive procedure. This most commonly occurs with patients being downstaged from an open procedure to liposuction alone.

6.8.2 Access Abdominoplasty

Using the abdominoplasty incision to accomplish procedures for other body parts such as for breast augmentation helps minimize the need for additional incisions elsewhere [27]. Liposuction of the flank and thigh can be done, extending the lower abdominal incision allows for some thigh tightening and finally this incision can be used to insert breast implants [4, 27, 28]. Although we have not found the need for its use, rectus fascia, dermal fat grafts, or free fat grafts may be harvested directly through this incision instead of harvesting fascia (tensor fascia lata) or fat elsewhere.

6.9 Special Considerations

There are several situations that do not fall into these categories [6]:

6.9.1 Men

Men tend to accumulate fat in the lumbar roll (flank or “love handle”) between the second and fourth lumbar

spines. The treatment of this area usually requires circumferential liposuction using large volumes of dilute local anesthesia with multiple entry points (usually five), use of sharper cannulas, alterations in positioning (prone, decubitus, and supine), multi-layer liposuction, and disinsertion of the restraining skin crease.

6.9.2 Umbilicus

Patients may complain of excess or damaged skin in the periumbilical region and are candidates for a Type 4 procedure. However, some patients are averse to the large incision from this procedure and fall into the downstaging category. Ways to treat this problem include a reverse abdominoplasty (best in patients who have preexisting inframammary scars), or an umbilical float procedure along with a limited lower skin excision that removes the excess skin. Sometimes, autologous fat injections in the periumbilical region or periumbilical skin excisions satisfy minor skin excesses.

6.9.3 Secondary Surgery

There are several circumstances in which this occurs. For instance, as a trade-off for undergoing extensive liposuction or “closed” procedures patients may then require revisions. Some patients who were appropriate candidates for liposuction and underwent the procedure return years later for treatment of the muscle or additional skin procedures. On the other hand, there are patients who have undergone abdominoplasty before the advent of liposuction and now require thinning of the abdominal wall.

6.9.4 Multiple Procedures

When combining an abdominoplasty with other procedures, consideration for performing these additional procedures should be assessed based upon the safety of these procedures alone as well as how the combination will affect the outcome. The additional operative time required for combined procedures is an important consideration that may contribute to the increased risk of complication such as thromboembolism.

6.9.5 Overhanging Pannus

These patients are often not ideal candidates for a type 4 abdominoplasty. As well they often possess a large intraperitoneal fat component that cannot be treated. Consideration for treatment includes direct excision of

the pannus with limited undermining as well as aggressive liposuction.

6.9.6

Postbariatric Surgery Patients

A new realm of plastic surgery is developing from the rapid growth of gastric bypass surgery to treat morbid obesity. The discussion for treatment of these patients is a book in itself. In brief, surgery for these patients should be delayed until their weight loss has stabilized. With the majority of these patients having severe skin redundancy and significant musculofascial laxity, many are best treated by circumferential lipectomy. Often this is one of many staged procedures that these patients will undergo to improve body contour as a result of significant weight loss.

6.10

Conclusions

A vast number of abdominal deformities can now be categorized and treated according to an abdominal classification system. Accurate diagnosis through careful screening and evaluation can lead to a straightforward treatment solution for most patients. With the addition of new technology over the past several years, modifications in the classification system have been made as these newer tools have allowed for less invasive procedures to be performed. Certainly, modifications of the treatment plan based upon specific patient requests and individual anatomic differences are always part of the decision making process; however, as for any operative plan, a classification of treatment options is often useful.

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