

A Pragmatic Way to Treat Abdominal Deformities Based on Skin and Subcutaneous Excess

Fabio Xerfan Nahas, M.D., F.A.C.S.

São Paulo, Brazil

Abstract. An objective classification for abdominoplasty based on subcutaneous and skin deformities is described. Type 0 patients are those who present excess fat with very little excess skin or without surplus skin, on which liposuction is indicated. Types I, II, and III are patients that demonstrate various degrees of excess skin and three basic patterns of skin resection are described. Type I patients present mild excess skin with a high umbilicus. Type II patients are those with mild excess skin and a well-positioned umbilicus, as well as patients with moderate excess skin. Type III patients present severely excessive skin. One hundred and eleven patients with abdominal deformity were reviewed and the incidence of each deformity was determined on this population. This study presents a practical classification that permits the plastic surgeon to critically evaluate which is the best option to correct abdominal deformities considering specific skin and subcutaneous deformities.

Key words: Abdominoplasty—Classification of abdominoplasty—Abdominal deformity—Suction assisted lipectomy—Liposuction

Patients with abdominal deformities have several degrees of excess skin and subcutaneous tissue. Therefore, a wide variety of aesthetic abdominal operations have been described on the past years. Bozola and Psillakis grouped these procedures creating a very useful classification based on subcutaneous excess fat and skin deformity [1]. However, some cases don't fit in any of the described deformity types.

A classification based on skin and subcutaneous de-

formity is described, on which any patient with abdominal deformity can be treated by a specific technique.

Methods

One hundred and eleven patients with abdominal deformities have been operated on by the author from 1994 to 2000, with a minimum follow-up of three months. One hundred and four were female and seven were male. Ages ranged from 16 to 59 years. The frequency on which the different skin and subcutaneous deformities occurred in these patients was reviewed. Patients were classified according to the cosmetic deformity and specific surgical treatment (Table 1).

Subcutaneous Tissue

Type 0

Deformity. These patients present an abdominal deformity due exclusively to excess subcutaneous tissue. There is no excess skin, although some patients displayed a little excess skin caused by previous pregnancy or weight loss.

Management. Correction of the deformity is achieved by suction lipectomy only (Figs. 1, 2).

Excess Skin

Type I

Deformity. These patients present mild excess skin and a high umbilicus.

Management. An incision slightly longer than the extension of a cesarean section is made, tangential to the

Table 1. Classification and treatment of abdominal wall deformities based on excessive subcutaneous tissue and skin

Deformity	Type	Clinical Finding	Treatment
Subcutaneous Tissue	0	Excess of subcutaneous tissue with little excess skin or no excess skin	Liposuction
Skin and Subcutaneous Tissue	I	Mild excess skin and a high umbilicus	Limited supra-pubic skin resection and umbilical repositioning
	II	Mild/moderate excess skin and well-positioned umbilicus	Supra-pubic incision 2 or 3 cm above the pubic hairline Removal of fat tissue underneath Scarpa's fascia
	II (exception)	The same as described in type II—associated with a midline supra-umbilical scar	Supra-pubic incision tangential to the pubic hairline, associated with a vertical midline incision (anchor-shaped incision)
	III	Severe excess skin	Supra-pubic incision tangential to the pubic hairline Removal of fat tissue underneath Scarpa's fascia

supra-pubic hairline. The abdominal flap is elevated, exposing the linea alba from the xyphoid process to the pubis. The umbilical pedicle is sectioned and the umbilical skin is maintained at the abdominal flap. The muscular defect is corrected and the excess skin is resected in the area marked by a canoe shape (Fig. 3A, B). The umbilicus is reattached in the aponeurosis not lower than 1 or 2 cm below its original position. Lipectomy is never performed during abdominoplasty on these patients (Fig. 4).

Type II

Deformity. These are patients with mild excess skin and a well-positioned umbilicus. Patients with moderate excess skin and a high or well-positioned umbilicus are also included in this group.

Management. In such cases, the surgeon is unable to resect the whole area of skin between the umbilicus and the pubic region because there will not be skin enough left with the flap to cover this area. The suprapubic incision is placed from 2–3 cm above the pubic hairline, extending across the whole abdominal width. The undermining exposes the whole area of the rectus muscles and the medial portion of the external oblique muscles (Fig. 3C, D). After trimming the excess skin and fat, the remaining abdominal flap is thinned by removing the fat tissue underneath Scarpa's fascia whenever the flap is thicker than the suprapubic area. The fascia is kept intact within the flap (Fig. 5).

Exception. An exception of type II patients are those who present a median supra umbilical scar. In patients who have undergone abdominoplasty, the midline scar will persist after the operation, not only in the superior, but also in the inferior abdomen. Therefore, in these cases, the incision is made on the inferior abdominal

fold, right above the pubic hairline, and the previous vertical midline scar is excised. After the undermining, the excess skin is removed under adequate tension. At the end of the operation, the abdomen will present an anchor shaped scar (Fig. 6A, B).

Type III

Deformity. Patients included in this group were those with severe excessive skin in the abdomen and present the umbilicus in a high or normal position.

Management. Removal of a fusiform area of skin from the umbilicus to the pubic hairline is performed. The area undermined is similar to the one described in type II patients (Fig. 6C, D). In some of these cases, the operating table is slightly bent to permit a tensionless closure. The abdominal flap is also thinned by removing the fat tissue underneath Scarpa's fascia whenever necessary (Fig. 7).

Clinical Cases

The patients were classified according the deformity and specific surgical procedure performed (Table 2).

Twenty-eight patients (25.2%) were type 0 and had syringe assisted lipectomy only. Seven of them had had previous abdominoplasty performed either on our service or elsewhere.

Eighty-three patients (74.8%) with variable amount of excess skin underwent abdominoplasty in this study. Only three (2.7%) were type I and needed limited skin resection combined with umbilical repositioning. Twenty-four patients (21.6%) were type II. Most cases (50.5%) were type III with severe excess skin.

Except for two cases, the aesthetic result was considered good or excellent by the surgeon and patient. The

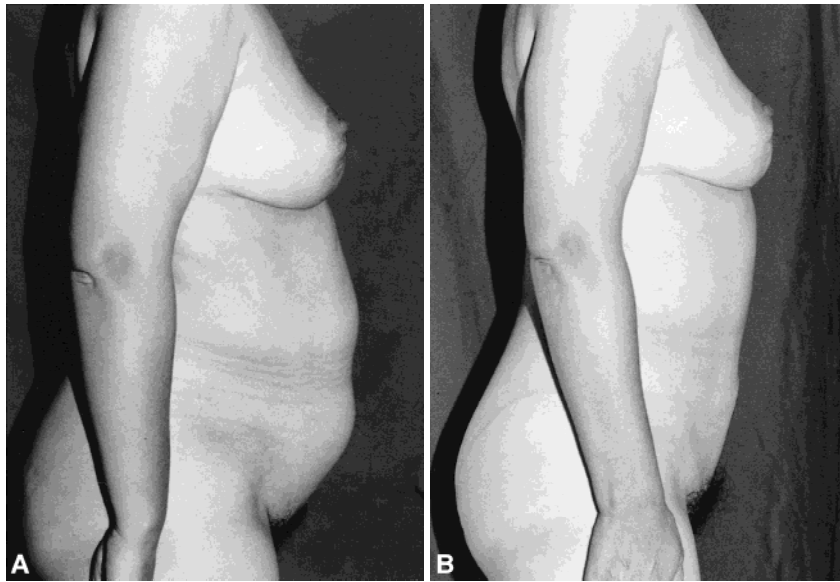


Fig. 1. (A) Type 0 patient with excessive subcutaneous tissue and little surplus skin. This patient had no previous pregnancy. She displayed good skin quality and no myoaponeurotic deformity. (B) Six months postop, the patient presents good skin retraction and a significant reduction of abdominal circumference. SAL alone was performed with removal of 1920 g of fat tissue.

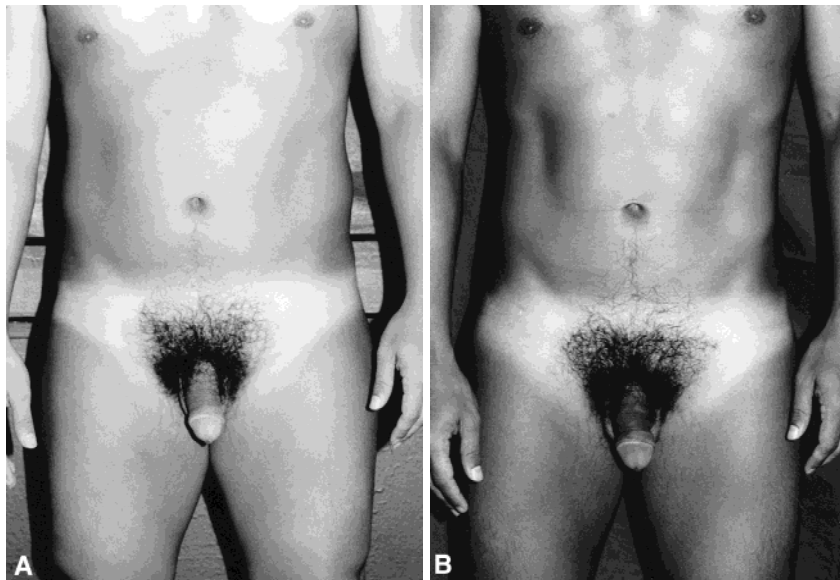


Fig. 2. (A) Type 0 patient with no excess skin, looking for abdominal contour definition. (B) Six months postop, with reduction of the subcutaneous tissue and achievement of a more defined muscular contour. SAL alone was performed with removal of 950 g of fat tissue.

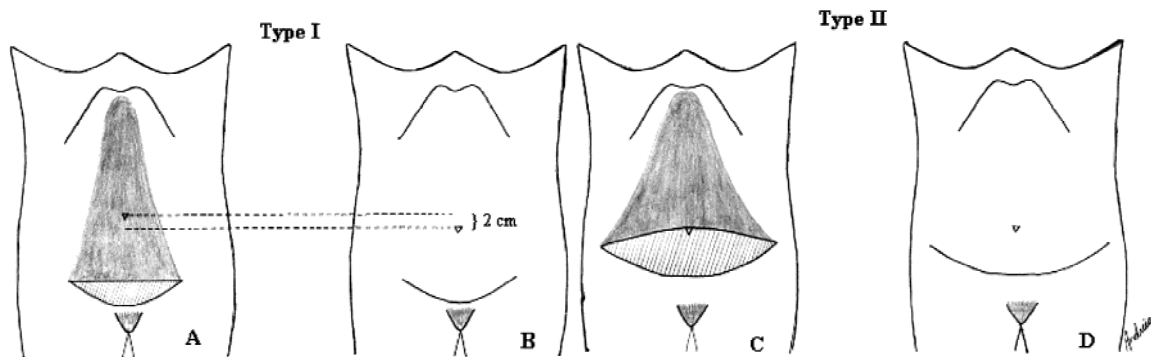


Fig. 3. (A) Diagram showing areas of skin resection and undermining of the skin flap on a type I patient. (B) Final aspect, demonstrating the umbilical repositioning. Please note the short scar, tangential to the supra-pubic hairline. (C) Areas of skin resection and undermining on a type II patient. (D) Final aspect demonstrating the high scar position on the inferior abdomen.

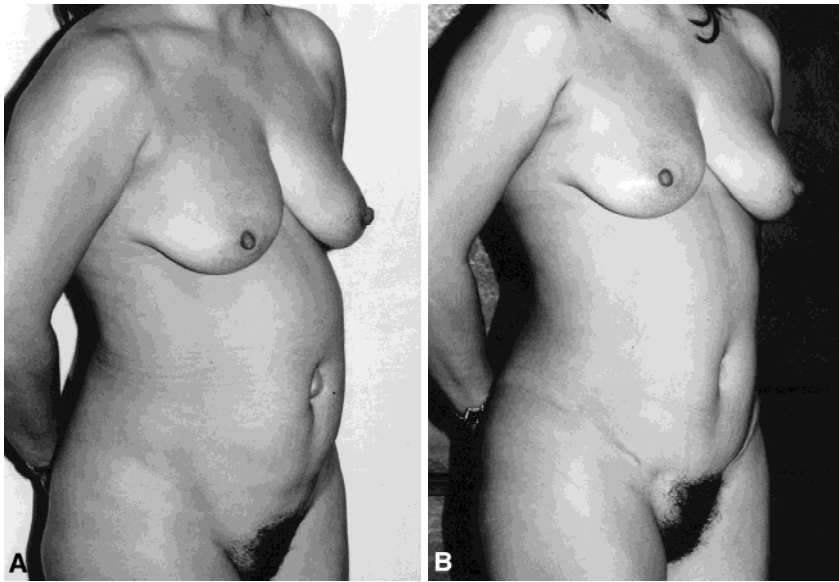


Fig. 4. (A) Type I patient with mild excessive skin and a short distance between the xyphoid process and the umbilicus. She also presented an umbilical hernia. (B) Six months postop after removal of suprapubic skin and fat (615 g) with umbilical repositioning 2 cm below its original location.



Fig. 5. (A) Type II patient with moderate excess skin and a well-positioned umbilicus. (B) Seven months postop after resection of a horizontal fuse of skin and fat (1100 g) between the umbilicus and 3 cm above the suprapubic hairline, resulting on a high positioned scar.

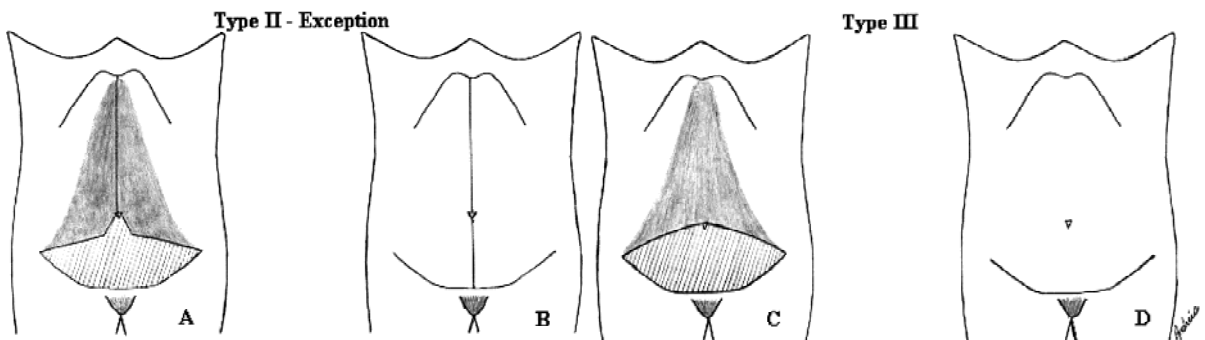


Fig. 6. (A) Diagram showing a type II patient with a suprapubic scar. These patients are treated with an incision above the supra-pubic hairline only as an exception. (B) Postoperative aspect with an anchor shaped scar. Note that the low transverse scar is placed tangential to the pubic hairline. (C) Areas of skin resection and undermining on a type III patient. (D) Final aspect demonstrating the scar placed tangentially to the supra-pubic hairline.

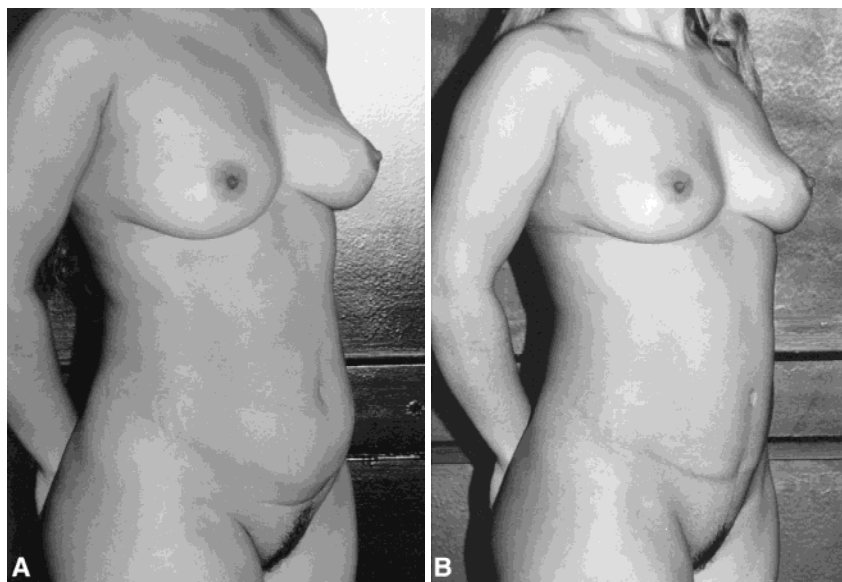


Fig. 7. (A) Type III patient with severe excess skin—verified by finger plication—and mild excess of subcutaneous tissue. (B) Patient one year after the operation on which skin and subcutaneous tissue (850 g) between the umbilicus and the pubic area were removed.

Table 2. Distribution of patients according to the classification described

Skin Deformity	Number of patients	%
Type 0	28	25.2
Type I	3	2.7
Type II	24	21.6
Type III	56	50.5
Total	111	100

first patient had a type III deformity and gained 6 kg after the surgery. Both the surgeon and the patient scored the result as regular. The other patient with type 0 deformity considered the result good, whereas the surgeon scored it as regular. This patient had intense fibrosis after suction lipectomy and developed mild areas of irregularity on the skin. Twenty-two out of 28 patients with type 0 deformity judged the result as excellent.

Either small scar deformities, dog ears, or umbilical stenosis occurred in 30 patients and all were corrected under local anesthesia in the office. Seroma, treated with syringe aspiration, occurred in 12 patients. One patient progressed with pulmonary emboli on the first postoperative day and recovered without decrease of pulmonary function.

Discussion

Determining which surgery will be the most appropriate for a patient with abdominal deformity is not always easy. At the first consultation, the quality and surplus of the skin, excess fat, and myoaponeurotic deformity should be evaluated. Any patient will fit in one of the types described on this classification. An exception are

patients on which aesthetic abdominal procedures are not indicated, such as excessively obese patients without skin surplus. Bozola and Psillakis successfully classified these deformities in five types [1]. However, patients with mild to moderate excess skin on the supra umbilical area with a well-positioned umbilicus—a very common type of abdominal deformity—were not included in this classification. These patients in our system of classification, are considered type II patients, and are treated with an incision positioned high on the abdomen. Other authors grouped abdominal deformities by focusing on the surgical treatment associated with SAL [3,4] or with endoscopic surgery [2,18]. As opposed to those studies, the classification described here is based exclusively on excision of excess skin and fat.

Abdominal deformities are caused not only by changes in the skin and subcutaneous tissue, but also in the myoaponeurotic system. The procedures described in this classification can be associated with any myofascial correction of the abdomen [6,11–17].

Few patients were considered type I (2.7%). This occurred because the indication for repositioning the umbilicus 2 cm below its original position was restricted to patients with mild excess skin on the superior abdomen. When patients that present moderate excess skin on this area are operated on by this technique, a second operation for removal of supra umbilical skin may be necessary few years later. This is an unfavorable situation because, in these cases, the surgeon may have limitations imposed by the previous surgery.

The inferior abdominal fold is the best place to make an incision in the anterior abdominal skin. This fold coincides with the suprapubic hairline in most cases. However, there are several patients with type II deformity in which this fold is located above the pubic hairline and it may be used to place the abdominoplasty incision with excellent cosmetic result.

A preexisting suprapubic horizontal scar, secondary to obstetrics or gynecological procedures, does not limit the indication of a high positioned parallel incision, 1 or 2 cm above the former in type II patients. This incision can be performed safely with low risk of skin necrosis between scars. In our series, 18 patients presented this situation without ischemic signs in this critical area.

When infraumbilical skin is left with the flap, some patients can develop a poor quality scar and a permanent edematous flap. Perhaps one of the reasons why this happens is that the lymphatic drainage of the skin below the umbilicus is mainly toward the inguinal region, whereas, above the umbilicus, it is toward the axillary region. In type II patients, the infraumbilical skin is completely removed, which decreases the chance of permanent edema.

A significant number of patients (21.6%) in our series presented type II deformity. A problem with the use of a high incision in these cases is the difficulty that the patient may have wearing a bikini. However, the other choice would be the use of a technique that results in an anchor-shaped scar, with the vertical scar reaching a higher level than the resulting scar of the proposed technique. This may limit the use of bikinis even more.

Type II patients that present a median supra umbilical scar, are usually treated with an anchor shaped scar, as described. Stenosis of the umbilicus is a possible complication in these patients, because of the extensive midline scar. Therefore, the suture between the umbilical skin and the abdominal flap should be performed under low tension [14].

Although we realize that leaving infraumbilical skin with the flap is not desirable, type I patients may benefit from limited skin resections with remaining infraumbilical skin. However, the fusiform area of skin resected from the inferior abdomen should not be too laterally in order to retain some lymphatic vessels.

It is important to stress that an inadequate correction of the myoaponeurotic layer may simulate an insufficient resection of subcutaneous tissue. Therefore, in all types described, rectus diastasis should be corrected in the entire extension of the abdomen. If the surgeon decides to correct the diastasis only below the umbilicus, a bulge may develop postoperatively in the superior part of the abdomen. This deformity becomes more evident when the patient is in the sitting position.

The fat tissue underneath Scarpa's fascia in types II and III was removed whenever necessary. This maneuver may be helpful in leveling the skin edge of the flap—which is usually thicker than the surrounding skin—with the suprapubic skin. This is a safe option of fat removal from the flap. If suction lipectomy of the flap is performed at the time of flap elevation, the fine abdominal contour may not be preserved. If liposuction is indicated, it will be performed at a second operative procedure. In fact, in our series, seven patients had suction lipectomy after abdominoplasty with good or excellent results. We believe that, at this moment, the areas of the abdominal surface can be better defined, permitting a more specific

and safe reshaping. We agree with Matarasso who suggested that the tissue above Scarpa's fascia should remain intact [5]. However, as opposed to liposuction, the removal of the tissue underneath this fascia is performed under direct vision, permitting more accurate localization as well as total resection of fat from this area.

Most patients on which correction of the myoaponeurotic layer is indicated have some degree of excess skin. Therefore, although we were pioneers on the research in the use of laparoscopy to correct rectus diastasis [7–10], the use of endoscopic techniques in the correction of abdominal deformities should be restricted to appropriate cases.

The high rate of complications such as scar deformities, dog ears, and umbilical stenosis were due to the extension of the incision, flap tension, and flap edema during abdominoplasties. These complications were judged in a very straightforward manner. Every possible effort was made to improve results and the surgeon often suggested revisions. The type 0 patient that presented pulmonary embolism displayed mild symptoms and had a favorable outcome. In this series no patient presented necrosis of the distal part of the abdominal flap. This occurred because the surgeon had the option to place the incision few centimeters above the pubic hairline whenever necessary, avoiding tension at the closure area. This option allowed a previous type III patient to turn into a type II. With this classification, it is possible to treat most types of abdominal deformities with low risk of flap necrosis. The high patient satisfaction index after abdominoplasty shows that type II patients accepted a high scar very well.

Finally, an adequate evaluation of the abdomen is the key point for a successful treatment. This study shows the frequency of these deformities in this population. We believe that this practical classification will permit plastic surgeons to objectively diagnose and treat abdominal deformities.

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