Ten Years of Outpatient Abdominoplasties: Safe and Effective

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Background: *Abdominoplasty has traditionally been described in the literature as an operation that is performed in a hospital setting, although more recently it is likely that most procedures are performed on an outpatient basis. To date, there have been very few large series illustrating the safety and efficacy of abdominoplasty performed in outpatient surgery centers.*
Objective: *This study reports the complications and revisions of outpatient abdominoplasties in a large patient population.*
Methods: *The charts of 519 consecutive abdominoplasty procedures performed at a single outpatient surgical center over the past 10 years (1996–2006) were reviewed. Follow-up was 6 months to 10 years, with an average of 4.3 years. Mean age at the time of operation was 43 years; range 19 to 74 years. Gender, smoking history, American Society of Anesthesiologists risk score, body mass index, type of abdominoplasty, and concurrent procedures were recorded. Each patient's chart was reviewed to assess complication and revision rates, including deaths, venous thromboembolism events, wound dehiscence, infection, seroma, hematoma, and scarring unacceptable to the patient or surgeon.*
Results: *The most common complication was seroma (10.6%), followed by unacceptable scarring of the abdominal or umbilical incisions (7.9%). The most common reason for revision was abdominal scar revision (6.4%). Most patients had concurrent additional procedures at the time of abdominoplasty, most commonly lipoplasty (91%). There was no statistically significant difference in complications or revisions when comparing groups based on age, body mass index, operating room time, smoking status, full abdominoplasty versus a less complex procedure such as a "mini" or floating umbilical abdominoplasty or simultaneous procedures. Men were significantly less likely to have a complication when compared with women.*
Conclusions: *This large retrospective study of 519 consecutive abdominoplasty procedures performed on an outpatient basis demonstrates that abdominoplasties may be performed safely and effectively at an accredited outpatient surgery facility.*
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Abdominoplasty is a commonly performed aesthetic procedure. According to American Society for Aesthetic Plastic Surgery data, it is one of the top five cosmetic surgical procedures performed in the United States. Approximately 172,500 abdominoplasties were performed in 2006, compared with just 34,000 in 1997.[1]

Although the procedure is very common, few published studies are available to support outpatient abdominoplasty as a safe and effective operation. The purpose of this study is to document the safety record for more than 500 patients who had abdominoplasty in an outpatient surgery center over the past 10 years. We compared complication and revision rates to previously published data for abdominoplasty, performed both as an inpatient and an outpatient procedure.

Patients and Methods

Five hundred nineteen consecutive abdominoplasty procedures performed at a single, American Association for Accreditation of Ambulatory Surgery Facilities–certified outpatient surgery facility over the past 10 years (1996–2006) were reviewed retrospectively. Average follow-up was 4.3 years (6 months–10 years). All procedures were performed by one of two senior surgeons. All patients received general anesthesia by a board-certified anesthesiologist. Lower extremity sequential compression devices were placed before induction, and patients were given preoperative antimicrobial therapy, as well as 3 to 5 days of postoperative oral antibiotics. The patients who underwent a full abdominoplasty procedure (88%) received rectus abdominis fascial plication sutures.

In most patients, the abdominal flap was raised to the level of the xiphoid process, and lipoplasty of the flanks and hips was performed after infiltration with tumescent fluid. Twelve percent of patients had a less complex procedure, such as a lower abdominoplasty or an umbilical "float" procedure, in which undermining is limited to the lower half of the abdomen and minimal or no lipoplasty was performed. One to three closed suction drainage tubes were placed, exiting through the pubic skin. The umbilicus was either left in place or, in the case of a floating umbilical procedure, ligated at the base of the stalk and moved inferiorly. No urinary catheters were placed for the procedures, and the patients ambulated the evening of surgery. Most patients stayed the night in an outside aftercare facility after they left the surgery center or went home with a caretaker.

The patients' operative and office charts were reviewed retrospectively. All demographic data, operative notes, and postoperative complications were reviewed. A χ^2 test was used to determine the statistical significance of patient factors compared with complications and revisions.

Results

The average patient age at the time of surgery was 43 years (range 19-74 years). Most patients (83%) were female. The average body mass index (BMI) was 25 kg/m^3. Eighty-eight percent of procedures consisted of a full abdominoplasty, whereas 12% were considered to be floating or mini-abdominoplasties. The mean operative time was 142 minutes (range 45-310 minutes). The mean operative time for patients who had abdominoplasty performed alone without additional procedures was 111 minutes. Ninety-nine percent of patients had an American Society of Anesthesiologists (ASA) risk score of I or II, whereas only three patients had an ASA risk score III. Only 7% of patients had a recent history of smoking tobacco within 1 month before surgery. Patient demographics are listed in Table 1. Typical results are illustrated in Figures 1 to 3.

Ninety-one percent of patients had one or more additional procedures performed at the same time as the abdominoplasty procedure, most commonly lipoplasty (79%, average volume 1760 mL). Other additional procedures performed at the time of abdominoplasty are listed in Table 2, and the most common simultaneous procedures are depicted in Figure 4.

The most common postoperative complications were seroma (10.6%), unacceptable abdominal or umbilical scars (7.9%), and superficial wound dehiscence, with or without superficial cellulitis or suspected infection (5.6%) (Table 3). The patients with marginal wound dehiscence that appeared to be cellulitic were placed on oral antibiotics and the wound edges were debrided of devitalized tissue as needed. All suspected infections resolved with this treatment.

Table 1. Patient demographics: 519 patients

Number of female patients	431 (83%)
Number of male patients	88 (17%)
Average age	43 y
Average body mass index	25 kg/m^3
Average follow-up	4.3 y
Number of smokers	36 (6.9%)
Patients with one or more additional procedures	473 (91%)
Patients with additional lipoplasty only	410 (79%)
Average volume liposuctioned	1760 mL
Patients with secondary procedure	170 (33%)
Full abdominoplasty	457 (88%)
Limited abdominoplasty	62 (12%)
Mean OR time, combined procedures	142 min
Mean OR time, abdominoplasty alone	111 min
Number of revisions	52 (10%)
Total number of complications	145 (28%)

No deaths occurred. One pulmonary embolus was diagnosed and treated successfully. This patient was found to have a previously-unknown coagulation abnormality. One patient was hospitalized because of blood loss from a hematoma, and another patient required packed red blood cell transfusions because of blood loss during hematoma formation and evacuation.

Fifty-two patients (10%) required revision surgery. The most common reason for revision was unacceptable abdominal scarring (6.4%). Eight patients (1.5%) required revision for excess lateral tissue, two patients (0.4%) for unacceptable umbilical scars, two patients (0.4%) for unacceptable drain scars, two patients (0.4%) for hematoma evacuation, two patients (0.4%) for wound closure after dehiscence, one patient (0.2%) for drain replacement in the face of a persistent seroma after it was pulled out prematurely, one patient (0.2%) for residual abdominal tissue fullness, and one patient (0.2%) for rectus plication dehiscence. There were no umbilical skin losses (Table 4).

With a χ^2 test, there was no statistically significant difference in total number of complications when comparing groups on the basis of age, ASA score, smoking

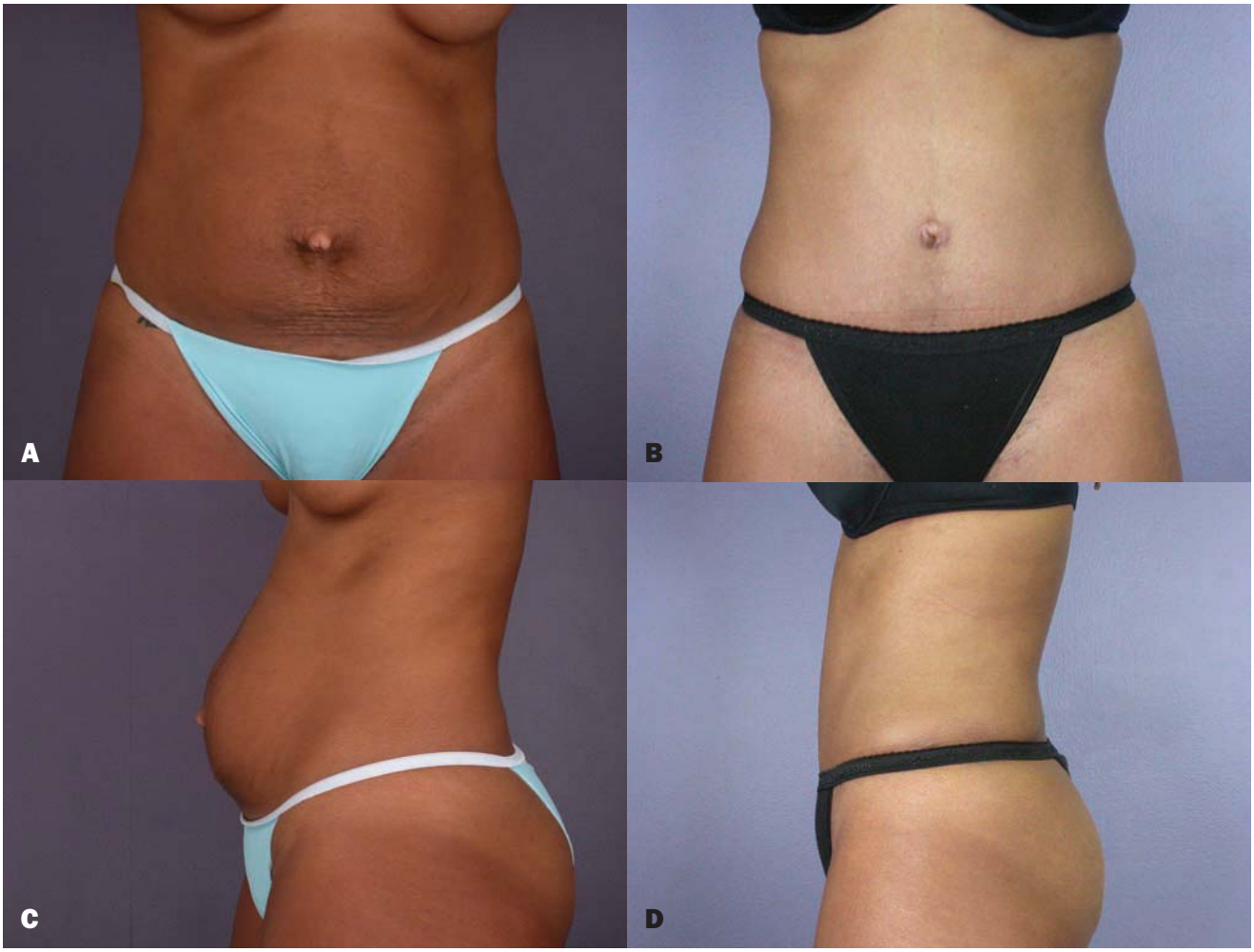

Figure 1. A, C, *Preoperative views of a 29-year-old woman.* **B, D,** *Postoperative views 2 months after abdominoplasty and lipoplasty of the abdomen, hips, and flanks.*

status, BMI, operative time, the presence of simultaneous procedures, or type of abdominoplasty (full versus limited abdominoplasty). There was a significant difference between sexes, with female patients experiencing a higher overall complication rate. There were no differences in revision rates when comparing patient demographics.

Discussion

The most common complication in this study population was seroma (10.6%). This correlates with previously published literature on abdominoplasty. Although seroma is often cited as the most common complication, incidence varies greatly from 1% to 42%.[2-8] In this study, most patients had two or three drainage catheters placed. They were removed when the total daily output was 20 mL to 30 mL or less, usually within 10 to 14 days after surgery. Patients were instructed to ambulate immediately after surgery, but they were cautioned to not resume full activity for 6 weeks and to wear a snug abdominal binder so as not to allow excess shearing of the abdominal flap. Lipoplasty was performed concomitantly with abdominoplasty in most patients. Kim and Stevenson[3] performed a study concluding that lipoplasty of the flanks in concert with abdominoplasty does not appear to increase the risk of seroma formation, which our study supports. However, in contrast to that study, we did not find an increase in seroma formation when correlated to obesity.

Unacceptable scarring caused by scar widening or superficial wound dehiscence is another common local complication of abdominoplasty. In the literature, reports of wound dehiscence and general poor scarring range from 0.9% to 8%.[5,6,9-11] In contrast to other

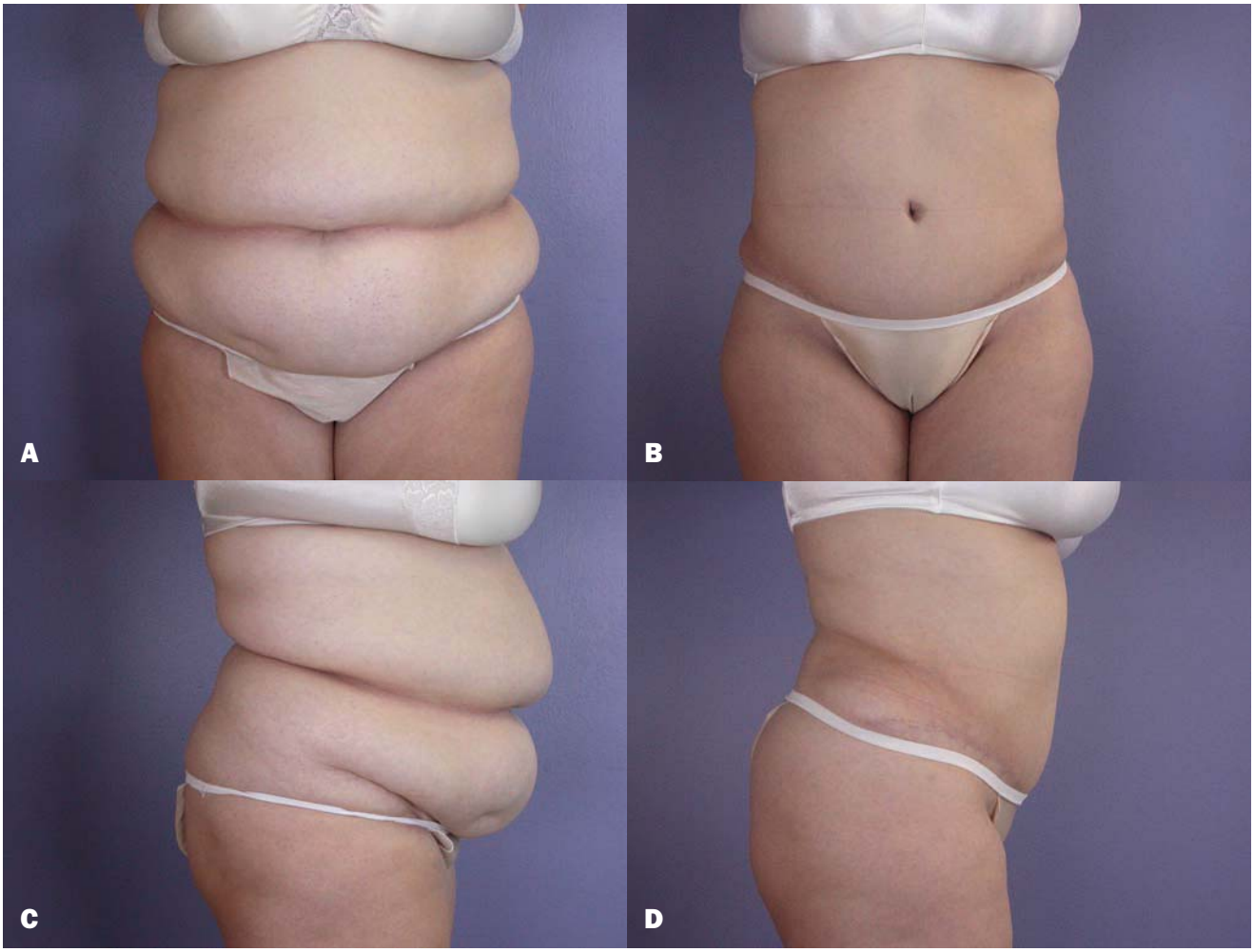

Figure 2. A, C, *Preoperative views of a 41-year-old woman before undergoing 4 L of lipoplasty, followed 6 months later by abdominoplasty and an additional 900 mL of lipoplasty.* **B, D,** *Postoperative views 10 months after the second operation.*

studies, we looked at total number of unacceptable scarring and number of superficial wound dehiscence separately, although the latter often is the cause of poor scarring.

In this study, the average BMI was 25 kg/m^3. In a recent comparison of outpatient and inpatient abdominoplasty by Spiegelman and Levine,[4] the average BMI of inpatients was 27.4, and the average BMI of outpatients was 23.4. One of the reasons they cited for keeping the patient overnight was obesity. However, they did not find a correlation between complication rate and inpatient/outpatient status or BMI. These results are also consistent with other studies that do not show an association between obesity and complications.[4,12] Rogliani et al[13] reported an increased complication rate in patients who were obese (BMI $\geq$ 30), but no increased complication rate in those who were normal or overweight (BMI < 30).[13] Another recent study comparing a small population of inpatient versus outpatient abdominoplasty reported excluding patients with a BMI greater than 35 kg/m^3 from outpatient surgery.[14]

Although we do not adhere to a specific exclusion criteria based on BMI alone, comorbidities associated with obesity must be considered when planning a patient's postoperative course. Patients with a high BMI or other medical problems must be individually evaluated. For example, if a patient will be unable to ambulate well after surgery or may have respiratory compromise because of excess weight, this patient will be better cared for in a hospital setting after surgery.

Our outpatient abdominoplasty complication rates compare favorably with complication rates for inpatient

Figure 3. A, C, *Preoperative views of a 39-year-old woman who lost 100 pounds through diet and exercise.* **B, D,** *Postoperative views 5 weeks after abdominoplasty.*

abdominoplasty reported in the literature. A recent study reported a 10.8% rate of inpatient and 3.1% rate of outpatient wound infections. That same study noted a 5.4% rate of inpatient and 6.2% rate of outpatient wound dehiscence/marginal necrosis. Seromas were reported in 18.9% of inpatients and 25% of outpatients.[4] Another study reported a wound complication rate of 64.3% (male patients) and 15.3% (female patients) for inpatient abdominoplasty.[12]

Our revision rate was 10%. Most revisions were for unacceptable scarring of the umbilicus or abdominal incision. Stewart et al[5] reported complications of 278 abdominoplasties, with a revision rate of 24%, most commonly for further lipoplasty and dog ear and scar revision.[5] Kryger et al[7] documented a revision rate of 5% for suboptimal scars in their study of abdominoplasty performed under conscious sedation.[7] This revision rate may vary on the basis of the expectations of the patients and the revision rate policy of the surgeons.

Statistical analysis did not find any significant risk factors for complications or revisions when comparing age, operative time, BMI, smoking history, ASA score, and simultaneous additional procedures, although men were significantly less likely to experience a complication in our study. This finding differs from a study reported by van Uchelen et al,[12] which reported a much higher incidence of wound complications in men when compared with women. Our results may be biased because of the small number of male patients in our series. The amount of abdominal tightening, the degree of undermining, or the quality of the skin may also contribute to gender differences in complication rates.

Table 2. Simultaneous procedures performed with abdominoplasty

Type of Procedure	Number of patients
Lipoplasty	410
Mastopexy	29
Breast augmentation	27
Mastopexy-augmentation	22
Breast reduction	18
Removal and replacement of implants	17
Blepharoplasty	17
Scar revision	5
Umbilical hernia repair	5
Rhinoplasty	4
Brachioplasty	4
Thermacool	4
Ventral hernia repair	3
Chin augmentation	2
Laser resurfacing	2
Fat injection	2
Nevus excision	1
Buttock lift	1
Inverted nipple repair	1
Chemical peel	1
Areolar skin graft	1

The authors' philosophy on outpatient abdominoplasty focuses on patient safety, which includes an analysis of coexistent medical comorbidities and operative time, patient comfort, and optimal results. Most patients evaluated at the authors' office are relatively young and healthy. There are certainly patients that fall outside the mean age range or BMI, but this is not thought to be a problem unless other medical problems coexist. Generally, multiple procedures are scheduled simultaneously if the total estimated operative time is 4 hours or less. Postoperative pain and nausea can be effectively managed with oral medications and judicious general anesthesia. The encouragement of patient mobility and oral hydration can also be performed outside of a hospital facility, as well.

Although outpatient abdominoplasty is safe and effective, it must be noted that patients need to have responsible caretakers stay with them after surgery. Whether this is at home or in an aftercare facility, it is the authors' view that patients should not spend the first days after surgery alone. We believe it is imperative that patients ambulate the day of surgery and take in adequate oral fluids, and all patients need a caregiver to prompt them and help them do this. Venous thromboembolism precautions must be taken, and patients with a higher risk for medical complications may still need to be treated as inpatients, if warranted.

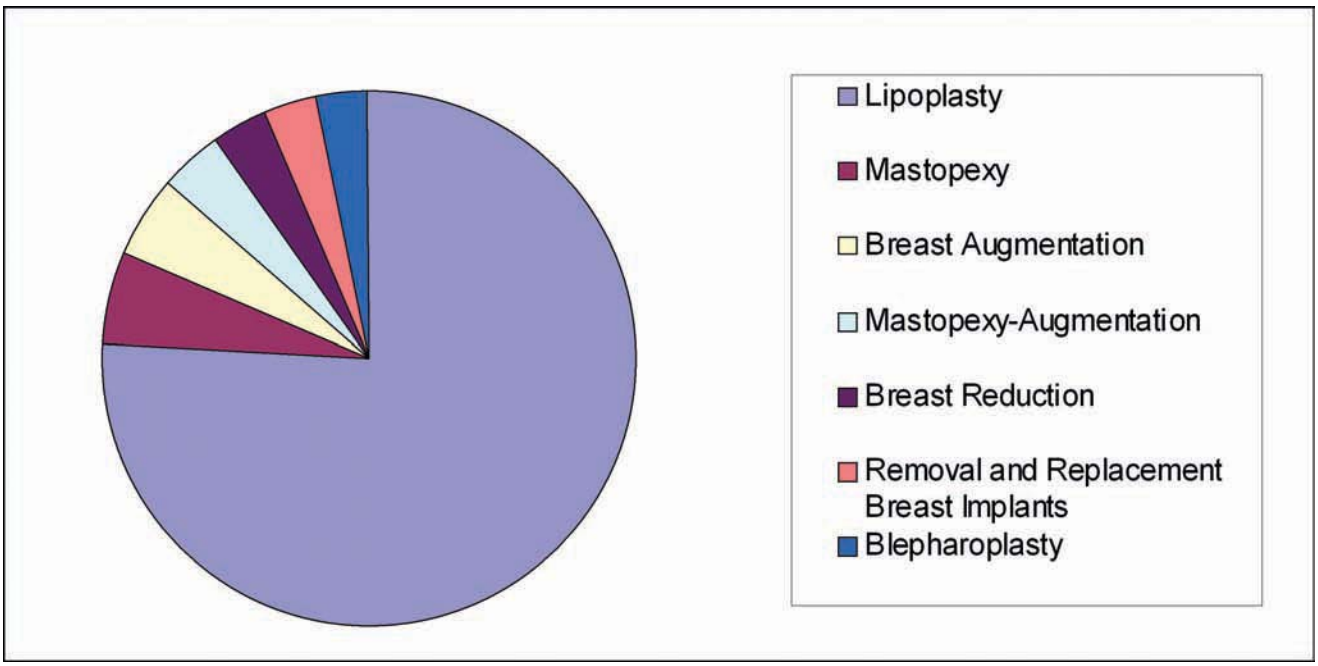

Figure 4. *Most common procedures performed simultaneously with abdominoplasty.*

Table 3. Complications*

Type of complication	Number of patients (%)
Seroma	55 (10.6)
Unacceptable abdominal scar	31 (6)
Superficial wound dehiscence†	29 (5.6)
Unacceptable umbilical scar	10 (1.9)
Residual lateral tissue fullness	10 (1.9)
Residual abdominal tissue fullness	3 (0.58)
Hematoma	2 (0.4)
Unacceptable drain scars	2 (0.4)
Recurrent diastasis	2 (0.4)
Pulmonary embolus	1 (0.2)
Total number of complications	145 (28)

*More than 1 complication occurred in some patients.

†In many cases, patients with superficial wound dehiscence went on to have unacceptable scarring and were counted in that category as well.

Table 4. Revisions

Type of revision surgery	Number of patients (%)
Abdominal scar revision	33 (6.4)
Revision of lateral tissue fullness	8 (1.5)
Revision of abdominal tissue fullness	1 (0.2)
Umbilical scar revision	2 (0.4)
Drain replacement	1 (0.2)
Hematoma evacuation	2 (0.4)
Rectus plication revision	1 (0.2)
Drain scar revision	2 (0.4)
Wound closure	2 (0.4)
Total number of revisions	52 (10)

Conclusion

Our large retrospective study of 519 consecutive abdominoplasty procedures performed on an outpatient basis demonstrates that abdominoplasties may be performed safely and effectively at an accredited outpatient surgery facility. ■

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References

1. American Society for Aesthetic Plastic Surgery. 2006 Statistics. Available at: http://www.surgery.org/download/2006stats.pdf. Last accessed March 27, 2007.
2. Baxter RA. Controlled results with abdominoplasty. *Aesthetic Plast Surg* 2001;25:357-364.
3. Kim J, Stevenson TR. Abdominoplasty, liposuction of the flanks, and obesity: analyzing risk factors for seroma formation. *Plast Reconstr Surg* 2006;117:773-779; discussion 780-781.
4. Spiegelman JI, Levine RH. Abdominoplasty: a comparison of outpatient and inpatient procedures shows that it is a safe and effective procedure for outpatients in an office-based surgery clinic. *Plast Reconstr Surg* 2006;118:517-522; discussion 523-524.
5. Stewart KJ, Stewart DA, Coghlan B, Harrison DH, Jones BM, Waterhouse N. Complications of 278 consecutive abdominoplasties. *J Plast Reconstr Aesthetic Surg* 2006;59:1152-1155.
6. Hester TR Jr, Baird W, Bostwick J 3rd, Nahai F, Cukic J. Abdominoplasty combined with other major surgical procedures: safe or sorry? *Plast Reconstr Surg* 1989;83:997-1004.
7. Kryger ZB, Fine NA, Mustoe TA. The outcome of abdominoplasty performed under conscious sedation: six-year experience in 153 consecutive cases. *Plast Reconstr Surg* 2004;113:1807-1817; discussion 1818-1819.
8. Dillerud E. Abdominoplasty combined with suction lipoplasty: a study of complications, revisions, and risk factors in 487 cases. *Ann Plast Surg* 1990;25:333-338; discussion 339-343.
9. Grazer FM, Goldwyn RM. Abdominoplasty assessed by survey, with emphasis on complications. *Plast Reconstr Surg* 1977;59:513-517.
10. Pitanguy I. Abdominal lipectomy. *Clin Plast Surg* 1975;2:401-410.
11. Stevens WG CR, Vath SD, Stoker DA, Hirsch EM. Does lipoplasty really add morbidity to abdominoplasty? Revisiting the controversy with a series of 406 cases. *Aesthetic Surg J* 2005;25::353-358.
12. van Uchelen JH, Werker PM, Kon M. Complications of abdominoplasty in 86 patients. *Plast Reconstr Surg* 2001;107:1869-1873.
13. Rogliani M, Silvi E, Labardi L, Maggiuli F, Cervelli B. Obese and nonobese patients: complications of abdominoplasty. *Ann Plast Surg* 2006;57:336-338.
14. Mast BA. Safety and efficacy of outpatient full abdominoplasty. *Ann Plast Surg* 2005;54:256-259.

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