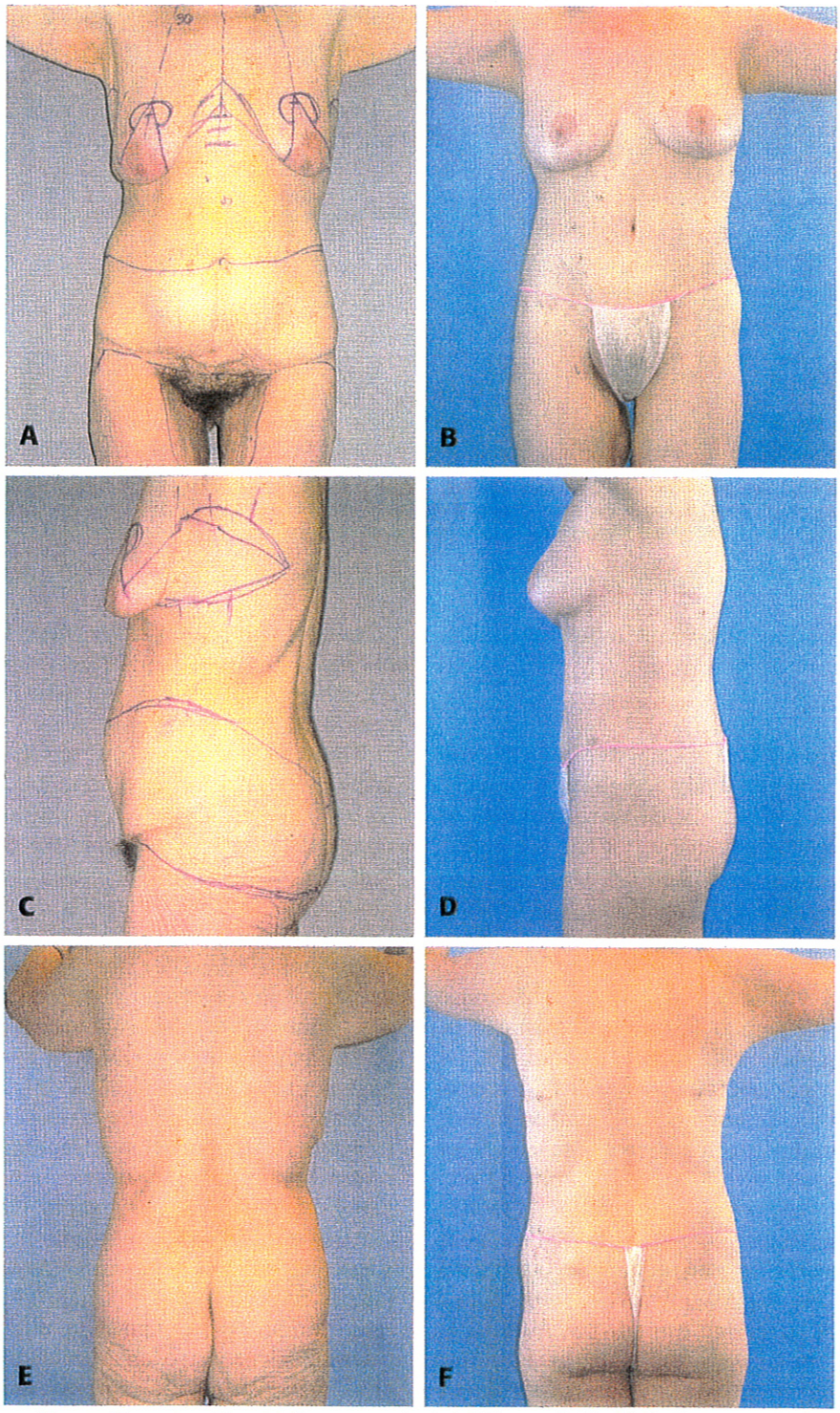

Figure 1. **A, C, E,** Preoperative markings on a 49-year-old woman who lost 154 pounds after bariatric surgery. **B, D, F,** Postoperative views 3 years after single-stage total body lift surgery.

the office procedure room or coincidental to another stage. Seventeen patients had major scar revisions.

The preoperative and postoperative Pittsburgh rating grades of severe, moderate, and mild deformity of all 75 cases are noted in Figure 4. There was a similar improvement in ranking across the board for both single- and multistage procedures, with most patients needing no further plastic surgery.

Overall, in patients under 55 years of age with a BMI of less than 30, there was no significant difference in the choice of procedure (ie, singe-stage TBL [95% confidence interval, 1.236–2.302] or multistage TBL (95% confidence interval, 1.687–4.892; $P = .1882$). While there was no significant association between major complications and the number of procedures performed in this cohort of patients, there were

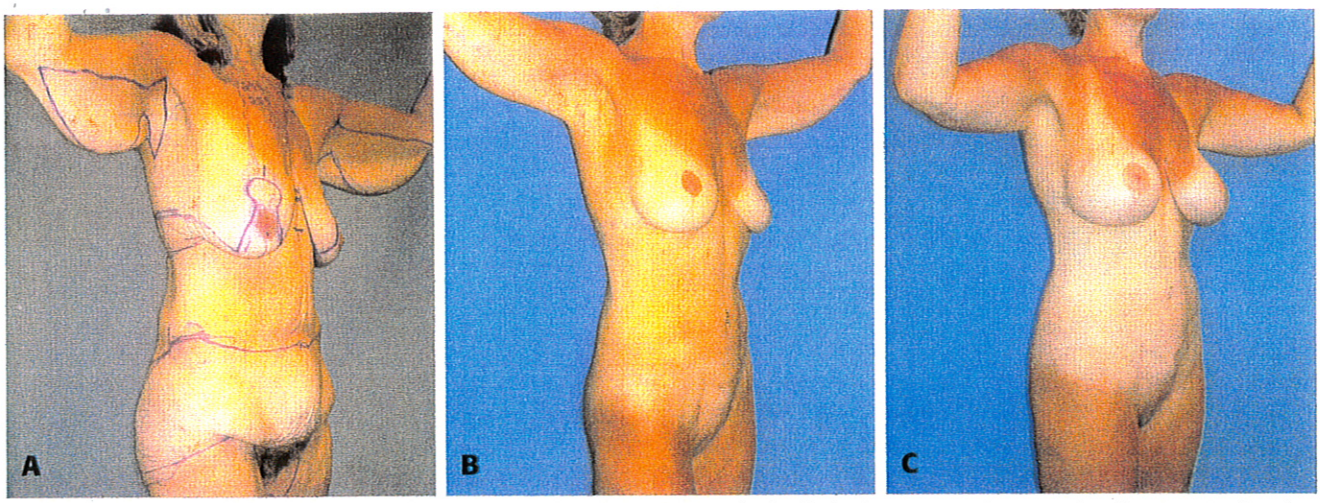

Figure 2. A, Preoperative markings on a 36-year-old woman who lost 134 pounds after bariatric surgery. **B,** Postoperative view 2 years after single-stage total body lift surgery. **C,** Postoperative view after bilateral partial subpectoral breast augmentation with 300-cc saline-filled implants and further reduction of her upper arms, performed 3 years after total body lift surgery (1 year after *B*).

increased wound healing problems following multistage TBL ($P > .5$).

DISCUSSION

A total of 102 Hurwitz Center massive weight loss patients underwent major body contouring surgery between January 2001 and June 2006. More than 70% of these patients completed TBL surgery. While the operations were complex and lengthy, and beset with complications, they were reliable and safe. There was uniform significant improvement in the Pittsburgh graded body contouring scale.

As elaborated by Pitanguy,[4] long operations under team surgery on the skin and fat are well tolerated in healthy elective patients. TBL surgery should not be compared to prolonged and often complicated operations in chronically ill, immunologically compromised, or multiple-organ–traumatized patients. Muscles, viscera, and bone, tissues known to initiate a profound systemic inflammatory response when injured, are not violated. The skin incisions are closed soon after opening with limited exposure for contamination. As opposed to other patients undergoing lengthy surgical procedures, TBL patients are conversant and comfortable immediately after surgery and are moved from a short stay in our recovery room to the regular nursing floor, not the intensive care unit. Rare instances of nausea and vomiting end in the recovery room, as these patients are not sick. Deteriorating vital signs and urine output are readily treated with adjustments in intravenous fluids, blood transfusions, and diuretics. Pain and edema management are difficult issues; adequate deep breathing and early ambulation are hard to achieve.

The great concern in TBL surgery is that if healing goes awry and infection occurs, the early postoperative course can rapidly deteriorate. Three of the patients listed in Table 3 (infected Gortex hernia patch; clindamycin-induced Clostridii pseudomembranous colitis; and thigh abscesses with sepsis) experienced life-threatening complications that were expeditiously and successfully treated. Patients should be informed of serious hazards to ensure compliance with follow-up.

These patients should be advised that a high wound healing complication and thrombotic rate is to be expected.[15–21] Complications mostly relating to wound healing occurred in 76% of our massive weight loss patients. This is comparable to Shermak's data[20] (Table 2). With multiple operations, there is a presumed increased necessity for blood transfusion, risk of infection, and thrombophlebitis. Only the increased transfusion rate was noted in our series. The risks (perhaps higher) and failure rate of the alternative scenario of multiple body contouring operations staggered over a period of years have not been addressed in the literature.

Major complications were defined as delaying return to activities for more than 2 months or an unscheduled return to the operating room or hospital. The rate of major compilations per patient was high. Of the 75 patients treated, 51 underwent their TBL in a single stage. This group experienced a 24% major complication rate as compared to a 31% rate for the 14 patient two-stage group. If the complication rates are recalculated for the number of procedures performed, far more acceptable complication rates of 6% and 9%, respectively, occurred. In such complex operations, patient outcomes are hard to ascertain. Most patients offered gratifying testimonials.[2] A look at the revision rate and magnitude of revision is a reasonable indicator of outcome quality. While there are a large number of minor revisions at 44%, the rate for complete redo of a procedure is low at 2%. We also applied the Pittsburgh Weight Loss Rating Scale modified for the area of treatment pre- and postoperatively. All patients improved and most had no further treatable deformity (Figure 4).

Our patient selection criteria, surgical, technique, and care all evolved over the 5 years covered in this

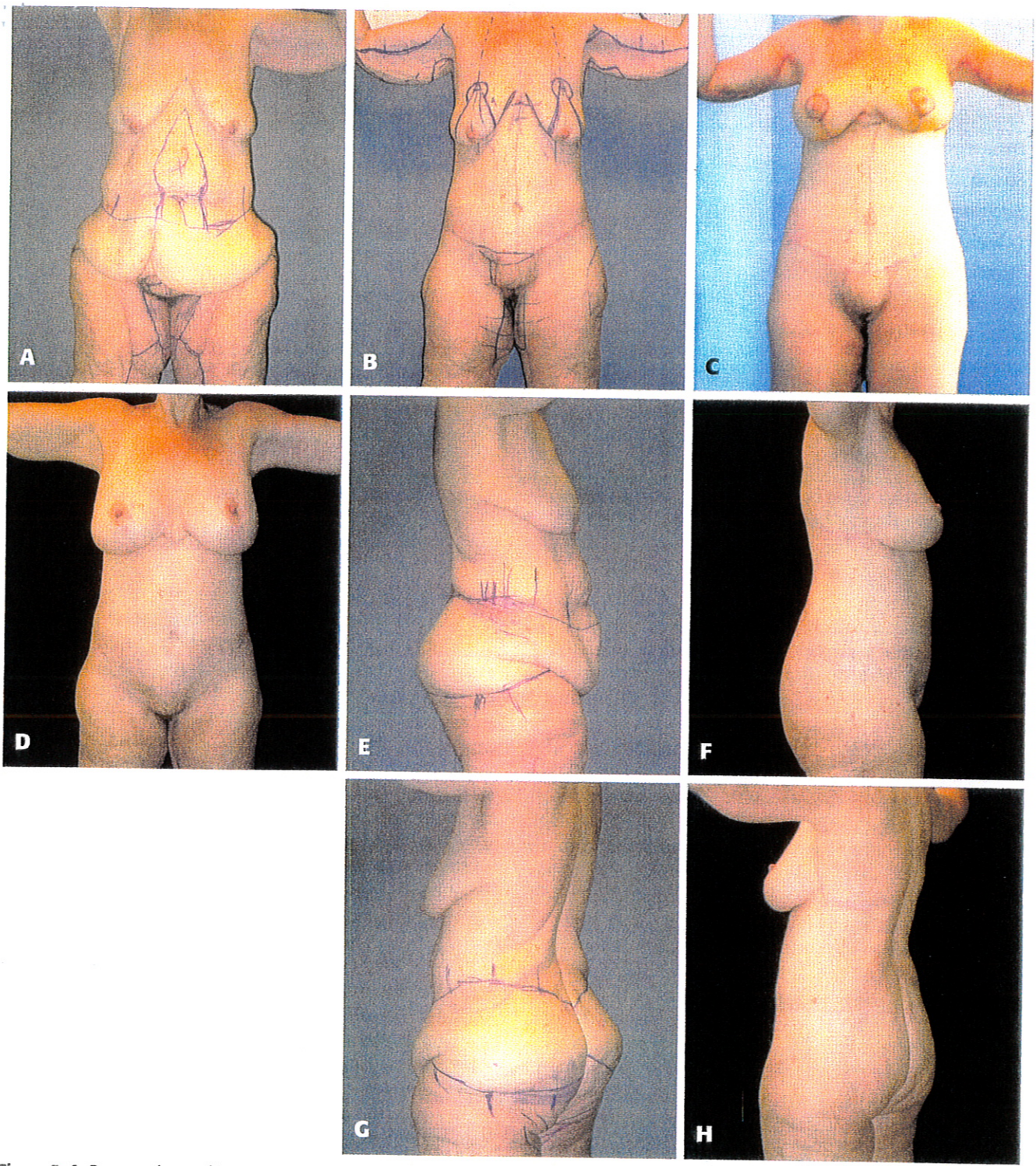

Figure 3. **A,** Preoperative markings on a 39-year-old woman who lost 222 pounds after bariatric surgery and underwent two-stage total body lift surgery because of a high BMI (33) and a large lower body. **B,** Postoperative view 5 months after first-stage surgery including abdominoplasty, lower body lift, and L thighplasty, with preoperative markings for second-stage surgery. **C,** Postoperative view 2 weeks after second-stage surgery that included an upper body lift with breast reshaping using the spiral flap, L brachioplasties, and further excision of medial thigh skin and lower body lipoplasty. **D,** Postoperative views 13 months after second-stage surgery. **E** and **G,** Preoperative lateral and posterior oblique views before first-stage surgery. **F** and **H,** Postoperative lateral and posterior oblique views 13 months after second-stage surgery.

review.[5,7,22-29] The optimal patient profile for single-stage TBL evolved to include age under 50 years, BMI under 30, and a patient who is healthy, physically fit, and motivated.[5]

During the course of this review, every procedure was substantially changed. Our abdominoplasty technique now is closely related to the Brazilian lipoabdominoplasty of Saldanha[30] and the central high-tension abdominoplasty of Le Louarn and Pascal,[31] leading to a dramatic reduction in seromas and distal skin necrosis. Our pubic monsplasty,[22] a 3-sided picture frame excision using

Table 2 Complications

Complication	Shermak et al.[a] no. (%)	Current study 75 patients no. (%)	Current study 605 procedures no. (%)
Delayed wound healing	20 (14)	10 (13)	18 (3)
Seroma	18 (13)	28 (37)	37 (6)
Seromas requiring surgery	1 (1)	2 (3)	2 (0.3)
Cellulitis/ abscess	4 (3)	5 (7)	5 (0.8)
Thromboembolism	4 (3)	1 (1)	1 (0.2)
Bleeding requiring return to OR	2 (1)	2 (3)	2 (0.3)
Suture abscess requiring operation	2 (1)	0 (0)	0 (0)
Drains requiring an operation	1 (1)	0 (0)	0 (0)
Bleeding ulcer requiring transfusion	1 (1)	0 (0)	0 (0)
Prolonged pain	1 (1)	2 (3)	2 (3)
Extremity edema >4 months		3 (4)	5 (0.8)

[a]Shermak et al. reviewed 139 patients over 6 years, having 335 different procedures (an average of 2.4 procedures per patient), as compared to current series of 75 patients over 5 years, having 605 different procedures (an average of 8.3 procedures per patient).
OR, operating room.

lipoplasty rather than a central excision, improves shape without edema. Similarly, to reduce edema and lymphoceles, both the brachioplasty and vertical thighplasty have taken on an L shape and during the last year of the study were combined with vigorous preliminary lipoplasty.[32]

An initial dependence on silicone implant augmentation mastopexy has been superseded by spiral flap reshaping of the breasts with better retention of shape.[24–26] Bra line upper body lifts with meticulous securing of the inframammary fold (or its obliteration, in male patients) came into existence. Subsequently upper body lifts have been occasionally modified with Pitanguy-style sickle-shaped lateral rather than posterior excision extensions.[33] Buttock augmentation with adipofascial lower back flaps became common during the latter portion of this study. The lower body lift was modified to include a series of deeply placed quilting improved flap survival and prevention of wound infections. Aside from prolonged use of alternating leg pressure stockings, deep vein thrombosis and pulmonary embolism chemoprophylaxis begins 12 hours after lengthy surgery unless hemoglobin is falling.[34]

Also since the study, we have trained a massage therapist to be a postoperative patient care advocate; manager of edema, wounds, nutrition; and guardian of general well being. In addition to lymphatic massage, she leads the use of phototherapy and vibratory therapy. Our therapist has been replaced by another physician assistant and we also contract a physician consultant in lymphedema management. Our patients appreciate this intense therapeutic and psychological follow-up.

CONCLUSION

TBL surgery rehabilitates the entire torso and usually includes the extremities. TBL is customized for individu-

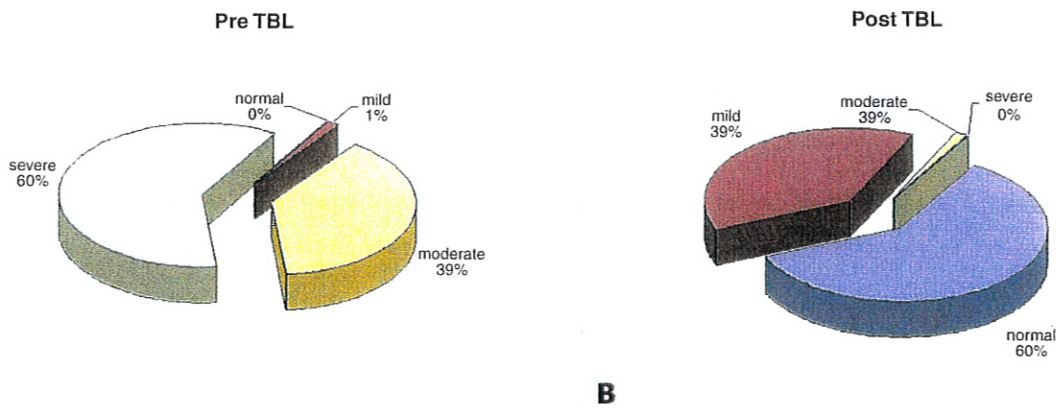

Figure 4. **(A)** Pre- and **(B)** postoperative pie distribution diagram of the Pittsburgh rating scale as judged by the senior author (DJH) clearly demonstrates a correction of weight loss deformity.