ORIGINAL ARTICLE

# Preoperative Weight Loss Before Bariatric Surgery

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**Hypothesis:** Preoperative weight loss reduces the frequency of surgical complications in patients undergoing bariatric surgery.

**Design:** Review of records of patients undergoing open or laparoscopic gastric bypass.

**Setting:** A comprehensive, multidisciplinary obesity treatment center at a tertiary referral center that serves central Pennsylvania.

**Patients:** A total of 881 patients undergoing open or laparoscopic gastric bypass from May 31, 2002, through February 24, 2006.

**Intervention:** All preoperative patients completed a 6-month multidisciplinary program that encouraged a 10% preoperative weight loss.

**Main Outcome Measures:** Loss of excess body weight (EBW) and total and major complication rates.

**Results:** Of the 881 patients, 592 (67.2%) lost 5% or more EBW and 423 (48.0%) lost more than 10% EBW. Patients referred for open gastric bypass (n=466) were generally older ($P < .001$), had a higher body mass index ($P < .001$), and were more often men ($P < .001$) than those undergoing laparoscopic gastric bypass (n=415). Total and major complication rates were higher in patients undergoing open gastric bypass ($P < .001$ and $P = .03$, respectively). Univariate analysis revealed that increasing preoperative weight loss is associated with reduced complication frequencies for the entire group for total complications ($P = .004$) and most likely for major complications ($P = .06$). Controlling for age, sex, baseline body mass index, and type of surgery in a multiple logistic regression model, increased preoperative weight loss was a predictor of reduced complications for any ($P = .004$) and major ($P = .03$) complications.

**Conclusion:** Preoperative weight loss is associated with fewer complications after gastric bypass surgery.

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Bariatric surgery has evolved as the preferred treatment for patients with morbid obesity who are motivated to improve their health and quality of life. The well-documented current obesity epidemic and the increased public awareness of the effectiveness of weight-reduction surgery in reversal of the poor health and quality-of-life concerns associated with morbid obesity have resulted in exponential growth in the number of surgical procedures of this type.

*See Invited Critique at end of article*

A combination of physician and patient enthusiasm for bariatric surgery has expanded the candidate pool for surgical referral to include older and sicker patients whose comorbid disease burden has eliminated most meaningful quality of life, as measured by various validated health surveys. The growing number of high-risk patients referred for bariatric surgery has stimulated investigators to expand preoperative assessment programs to attempt to identify surgical risk factors and to prepare patients better for surgery. DeMaria et al[1,2] recently developed and validated a bariatric surgery mortality risk score that uses body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) of greater than 50, male sex, hypertension, thromboembolism risk, and age of 45 years or older to stratify patients into surgical risk groups.

Despite the improved ability to accurately predict an increase in surgical risk, the optimal preoperative preparation of such high-risk bariatric surgery candidates remains controversial. Proposed risk-reducing strategies supported by varying degrees of evidence include staged surgical procedures,[3,4] preoperative gastric bal-

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loon placement for weight loss,[5] and preoperative medical weight reduction.[6-10]

Because limited weight loss has been shown to favorably affect obesity-related comorbid disease, our multidisciplinary bariatric surgery program has recommended a preoperative weight loss of 10% as a prerequisite for operation since the inception of the program in 2001. The impact of this preoperative weight loss in 884 consecutive patients who completed the surgical program was recently reviewed. This study found that a large fraction of the preoperative patient pool is able to achieve meaningful preoperative weight loss and that the amount of preoperative weight loss exerts a favorable effect on postoperative weight loss and the hospital length of stay for bariatric surgery.[9] Because the major determinant of postoperative length of stay is operative morbidity, we hypothesized that preoperative weight loss will reduce the frequency of surgical complications in patients who undergo bariatric surgery.

## METHODS

The study included all patients who underwent open or laparoscopic Roux-en-Y gastric bypass surgery for morbid obesity or its related comorbid medical problems from May 31, 2002, through February 24, 2006, at Geisinger Medical Center. Patients who underwent laparoscopic adjustable gastric banding were not included because of the significant difference in surgical risk and length of stay, as well as rate of weight loss postoperatively.

Since 2001, all bariatric surgery candidates have participated in a standardized, multidisciplinary preoperative program that involves medical, psychological, nutritional, and surgical evaluations, as well as patient education with regard to nutrition, weight loss techniques, and operative choices. The detailed aspects of the 6-month preoperative program have been described.[9] A loss of 10% excess body weight (EBW) is encouraged but not mandated, and no patient is denied access to surgery because of inadequate preoperative weight loss.

For the purposes of the current study, the patients were divided according to a prospective database into 5 cohorts, depending on the extent of preoperative weight loss achieved: those who gained more than 5% EBW (group 1), those who gained 0% to 5% EBW (group 2), those who lost 0% to 5% EBW (group 3), those who lost 6% to 10% EBW (group 4), and those who lost more than 10% EBW (group 5). The hospital record for each of the patients was reviewed retrospectively for operative complications. Those who reviewed the hospital records for complications were masked to the preoperative weight loss accomplishment of patients.

Postoperative complications are defined as follows:

- Respiratory: hypoxia, hypercarbia, need for reintubation, or significant dyspnea
- Bleeding: postoperative blood loss sufficient to require transfusion or additional operation
- Gastrointestinal: paralytic ileus, intestinal ischemia, intestinal obstruction, or internal hernia
- Feeding intolerance: delayed discharge from the hospital because foregut symptoms delayed diet progression
- Cardiac: atrial fibrillation or flutter
- Leakage: leakage from pouch, anastomosis, or excluded stomach
- Infection: pneumonia, sepsis, cellulitis, fever, *Clostridium difficile* infection, or wound infection
- Thromboembolism: proven deep vein thrombosis or pulmonary embolus
- Acute renal failure: renal failure that requires dialysis
- Urinary: urinary tract infection or urinary retention
- Wound: superficial wound complications that did not require hospitalization
- Wound readmission: wound complications that required subsequent admission to the hospital
- Stricture: gastrojejunal anastomotic stricture

Major complications include the following types:

- Respiratory
- Bleeding
- Leakage
- Thromboembolism
- Gastrointestinal
- Acute renal failure

Descriptive statistics, such as the calculation of means, percentages, and confidence intervals, were used to describe the study population. The analysis of variance, $\chi^2$, Fisher exact, and Kruskal-Wallis tests were used to compare demographics and presurgery BMI to presurgical weight loss. Statistical analysis software (SAS), version 9.1 (SAS Institute Inc, Cary, North Carolina), was used for data manipulation and statistical analysis. All tests were 2-sided, and $P<.05$ was considered statistically significant.

To determine if EBW loss before bariatric surgery was related to the 30-day complication rate, the Cochran-Armitage trend test and multiple logistic regression were used. Specifically, these analyses compared the rate of any complication and the rate of major complications between the presurgical weight loss groups. Trend tests were conducted for the overall population and separately for each type of procedure (ie, open and laparoscopic). However, because of the limited sample size, the multiple logistic regression models were conducted for the overall population only (1 model for any complication and 1 model for major complications). The regression models included covariates for type of procedure, sex, age, baseline BMI, and number of comorbidities. To determine whether the relationship between preoperative weight loss and complications was different on the basis of type of surgery, the interaction between type of surgery (laparoscopic vs open) and preoperative weight loss group was considered in the modeling.

## RESULTS

Of the original 884 patients previously described,[9] 881 underwent gastric bypass surgery and are included in this analysis. The mean (SD) age of the patients was 43 (10) years, and 692 (78.6%) were female. Of the 881 bariatric surgery patients, 415 (47.1%) underwent laparoscopic gastric bypass (LGB), and 466 (52.9%) underwent open gastric bypass (OGB). Those who were referred for OGB tended to be 55 years of age or older ($P<.001$), had a higher mean BMI at baseline and surgery ($P<.001$), and were more likely to be men ($P=.009$) (**Table 1**).

Preoperative weight loss varied, with accomplishments that ranged from modest weight gain to loss of more than 10% EBW. The patients were divided into 5 groups, dependent on the extent of preoperative weight loss achieved. Group 1 (n=67) gained more than 5% EBW (mean [SD], 6.9 [4.4] kg), group 2 (n=86) gained 0% to 5% EBW (mean [SD], 2.0 [1.1] kg), group 3 (n=136) lost 0% to 5% EBW (mean [SD], −1.9 [1.5] kg), group 4 (n=169) lost 6% to 10% EBW (mean [SD], −5.6 [2.1] kg), and group 5 (n=423) lost 10% EBW (mean [SD], −13.5

[7.8] kg). Statistically significant differences in the 5 groups are observed with regard to patient age ($P = .04$), baseline BMI ($P = .005$), and BMI at the time of surgery ($P < .001$). No statistically significant differences were found in comorbidity frequencies among the weight loss groups. Univariate comparisons of presurgical weight loss and patient characteristics are summarized in **Table 2**.

There was no 30-day surgical mortality in this study group. All the 30-day postoperative complications and their observed frequencies in the OGB and LGB patients are summarized in **Table 3**. There were fewer incidences of any ($P < .001$) and major complications ($P = .03$) after laparoscopic surgery. Statistically significant differences in complication rates between open and laparoscopic procedures were observed for respiratory complications ($P = .006$), cardiac complications ($P = .001$), wound complications ($P < .001$), urinary complications ($P = .002$), and anastomotic strictures ($P = .005$).

Statistically significant trends that confirm a diminishing likelihood of any complication with increasing preoperative weight loss are noted for the entire cohort ($P = .004$) and for those who underwent OGB ($P = .02$). A similar trend, although not statistically significant, is noted for those who underwent LGB ($P = .15$) (**Table 4**).

A multiple logistic regression model for prediction of any complication demonstrates that when age, sex, BMI, type of surgery, and number of comorbidities are kept constant, there is a statistically significant relationship between the crude and adjusted odds ratio for any complication and the extent of preoperative weight loss ($P = .008$). When compared with those who lost 10% or more of EBW, those who gained 5% or more EBW had a 2-fold increased likelihood of a complication. We did not find a statistically significant relationship between any of the individual comorbidities and the complication frequency either by bivariate analysis or in the multiple logistic regression model.

In addition, when age, sex, BMI, and number of comorbidities are kept constant, patients with OGB have a higher likelihood of having any complication ($P < .001$). Finally, in this study, sex ($P = .61$), 10-year incremental increases in age ($P = .47$), an incremental increase in baseline BMI of 10 ($P = .22$), and number of comorbidities ($P = .11$) were not statistically significant predictors of any complication (**Table 5**). The relationship between the extent of preoperative weight loss achieved and the reduced probability of any surgical complication occurring when age, sex, BMI, and number of comorbidities are held constant is true for both OGB and LGB (**Figure**).

**Table 1. Comparison of 881 Patients Who Underwent Laparoscopic vs Open Gastric Bypass Surgery**

| Characteristic | Laparoscopic Gastric Bypass (n=415) | Open Gastric Bypass (n=466) | *P* Value |
|---|---|---|---|
| Age, mean (SD), y | 43 (10) | 46 (10) | <.001[a] |
| Age ≥55 y, No. (%) | 55 (13.3) | 98 (21.0) | .002[b] |
| Male sex, No. (%) | 73 (17.6) | 116 (24.9) | .009[b] |
| Baseline BMI, mean (SD) | 48.7 (5.6) | 53.6 (9.0) | <.001[a] |
| Baseline BMI >50, No. (%) | 160 (38.6) | 295 (63.3) | <.001[b] |
| BMI at time of surgery, mean (SD) | 46.3 (5.6) | 51.0 (8.4) | <.001[a] |
| BMI at time of surgery >50, No. (%) | 101 (24.3) | 240 (51.5) | <.001[b] |

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).
[a] Determined via 2-sample *t* test.
[b] Determined via $\chi^2$ test.

**Table 2. Univariate Comparisons of Presurgical Weight Loss and Patient Demographics**

| | Total Presurgical Weight Loss | | | | | |
|---|---|---|---|---|---|---|
| Characteristic | Group 1: >5% EBW Gain (n=67) | Group 2: 0%-5% EBW Gain (n=86) | Group 3: 0%-5% EBW Loss (n=136) | Group 4: 6%-10% EBW Loss (n=169) | Group 5: >10% EBW Loss (n=423) | *P* Value |
| Age, mean (SD), y | 43 (11) | 43 (9) | 43 (10) | 45 (10) | 46 (10) | .04[a] |
| Age ≥55 y, No. (%) | 13 (19.4) | 9 (10.5) | 19 (14.0) | 28 (16.6) | 84 (19.9) | .20[b] |
| Male sex, No. (%) | 15 (22.4) | 22 (25.6) | 28 (20.6) | 34 (20.1) | 90 (21.3) | .90[b] |
| Baseline BMI, mean (SD) | 47.8 (7.6) | 51.4 (6.7) | 52.2 (8.1) | 51.5 (7.4) | 51.5 (8.3) | .005[a] |
| BMI at time of surgery, mean (SD) | 50.3 (8.2) | 52.1 (6.9) | 51.6 (7.8) | 49.5 (6.8) | 46.8 (7.2) | <.001[a] |
| Comorbidities, No. (%) | | | | | | |
| Hypertension | 28 (41.8) | 43 (50.0) | 70 (51.5) | 87 (51.5) | 220 (52.0) | .64[b] |
| Diabetes mellitus | 18 (26.9) | 32 (37.2) | 47 (34.6) | 66 (39.1) | 151 (35.7) | .51[b] |
| Sleep apnea | 24 (35.8) | 38 (44.2) | 60 (44.1) | 66 (39.1) | 137 (32.4) | .059[b] |
| Hypercholesterolemia | 18 (26.9) | 29 (33.7) | 40 (29.4) | 63 (37.3) | 151 (35.7) | .39[b] |
| Gastroesophageal reflux | 14 (20.9) | 18 (20.9) | 32 (23.5) | 47 (27.8) | 106 (25.1) | .70[b] |
| Depression | 17 (25.4) | 23 (26.7) | 30 (22.1) | 39 (23.1) | 94 (22.2) | .89[b] |
| Osteoarthritis | 14 (20.9) | 16 (18.6) | 30 (22.1) | 41 (24.3) | 99 (23.4) | .86[b] |
| Hypothyroidism | 7 (10.4) | 12 (14.0) | 18 (13.2) | 24 (14.2) | 53 (12.5) | .94[b] |
| Asthma | 6 (9.0) | 5 (5.8) | 14 (10.3) | 14 (8.3) | 46 (10.9) | .62[b] |
| Ischemic heart disease | 4 (6.0) | 3 (3.5) | 6 (4.4) | 7 (4.1) | 6 (1.4) | .051[c] |
| No. of comorbidities, median (range) | 2 (0-5) | 3 (0-6) | 3 (0-7) | 3 (0-6) | 2 (0-7) | .27[d] |

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); EBW, excess body weight.
[a] Determined via analysis of variance.
[b] Determined via $\chi^2$ test.
[c] Determined via Fisher exact test.
[d] Determined via Kruskal-Wallis test.

**Table 3. Number of Postoperative Complications Analyzed by Type of Surgery (Open vs Laparoscopic Gastric Bypass)**

| Complication | Total (N=881) | Open (n=466) | Laparoscopic (n=415) | *P* Value[a] |
|---|---|---|---|---|
| Wound | **62** | 53 | 9 | <.001 |
| Respiratory | **31** | 24 | 7 | .006 |
| Gastrointestinal | **26** | 13 | 13 | .84 |
| Bleeding | **18** | 13 | 5 | .15 |
| Leakage | **16** | 7 | 9 | .61 |
| Feeding intolerance | **14** | 11 | 3 | .06 |
| Subsequent admission for wound | **13** | 10 | 3 | .097 |
| Cardiac | **11** | 11 | 0 | .001 |
| Urinary | **10** | 10 | 0 | .002 |
| Thromboembolism | **8** | 5 | 3 | .73 |
| Infection | **7** | 5 | 2 | .57 |
| Stricture | **7** | 0 | 7 | .005 |
| Intestinal obstruction | **5** | 2 | 3 | >.99 |
| Marginal ulcer | **3** | 1 | 2 | >.99 |
| Renal failure | **2** | 1 | 1 | >.99 |
| Any complication | **175** | 124 | 51 | <.001 |
| Any major complication | **82** | 53 | 29 | .027 |

[a]Determined via Fisher exact test.

**Table 4. Presence of 30-Day Complications Analyzed by Gain or Loss of Excess Body Weight (EBW) Before Surgery**

| | No. (%) of Patients With Complications | | |
|---|---|---|---|
| EBW Loss | Total (N=881) | Open (n=466) | Laparoscopic (n=415) |
| Total | 881 (100) | 466 (100) | 415 (100) |
| Gain >5% EBW | 67 (28.4) | 35 (37.1) | 32 (18.8) |
| Gain 0%-5% EBW | 86 (27.9) | 45 (35.6) | 41 (19.5) |
| Loss 0%-5% EBW | 136 (23.5) | 79 (32.9) | 57 (10.5) |
| Loss 6%-10% EBW | 169 (14.2) | 100 (18.0) | 69 (8.7) |
| Loss >10% EBW | **423** (18.0) | 207 (24.6) | 12 (11.6) |
| *P* value for trend | .004 | .02 | .15 |

**Table 5. Multiple Logistic Regression Model That Predicts Presence of Any Complication**

| Variable | Crude/Adjusted[a] Odds Ratios (95% Confidence Intervals) | *P* Value |
|---|---|---|
| EBW before surgery | | |
| Gain >5% EBW | 1.81/1.95 (1.06-3.60) | .009 |
| Gain 0%-5% EBW | 1.77/1.81 (1.05-3.14) | |
| Loss 0%-5% EBW | 1.41/1.34 (0.83-2.17) | |
| Loss 6%-10% EBW | 0.76/0.70 (0.42-1.16) | |
| Loss >10% EBW | 1 [Reference] | |
| Type of surgery | | |
| Open | 2.59/2.37 (1.62-3.49) | <.001 |
| Laparoscopic | 1 [Reference] | |
| Sex | | |
| Male | 1.30/1.12 (0.75-1.68) | .58 |
| Female | 1 [Reference] | |
| Increases in age by increments of 10 | 1.15/1.13 (0.95-1.34) | .18 |
| Increase in baseline BMI by increments of 10 | 1.43/1.14 (0.92-1.42) | .24 |
| No. of comorbidities | 1.15/1.11 (0.98-1.27) | .11 |

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); EBW, excess body weight.
[a]The adjusted odds ratios were estimated from a logistic regression model that included all these items as covariates. All 2-way interactions were examined and none were found to be significant.

## COMMENT

To our knowledge, this is the largest study to date that investigates a possible association between preoperative weight loss in the context of a multidisciplinary bariatric surgery program and a reduced probability of surgical complications. This retrospective review of outcomes after 881 consecutive bariatric operations during a 45-month period was prompted by the recently published observation by Still et al[9] that those individuals who lost 10% or more EBW during the preoperative period were statistically less likely to have a long hospital stay.[9] Because complete analysis of surgical morbidity was not available in the prospective database, a retrospective review of hospital records of these same patients was conducted for this study.

The findings in this report suggest that the likely explanation for the reduced perioperative length of stay observed by Still et al[9] in patients who lost weight before bariatric surgery may be explained by a reduction in the frequency of surgical complications. The observed statistically significant trend toward reduced complication frequency after bariatric surgery with increasing preoperative weight loss was observed for both the OGB and LGB operations. The trend is not as pronounced for LGB as for OGB, perhaps because of the reduced complication rates observed after LGB. This reduced absolute rate of complications in the LGB cohort weakens the statistical power of the data analysis for this cohort. The observed association between reduced complication risk and the extent of preoperative weight loss is independent of the proven risk factors for bariatric surgery: age, sex, BMI, and number of comorbidities. In addition, because not all comorbid conditions are equally significant, we investigated the individual comorbidities to determine if

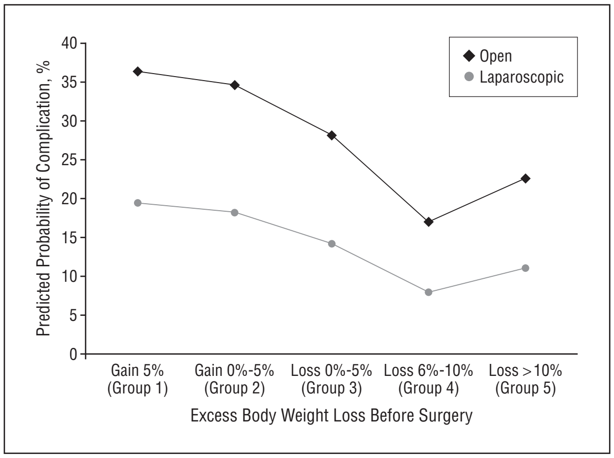


**Figure.** Predicted probability of complication rate by excess body weight loss and type of surgery.

any of them might correlate with complication frequency; we found no significant relationships.

The statistically significant increase in the observed complication rates after OGB compared with LGB is consistent with current bariatric surgery outcomes.[11] However, these results must be reconciled with the apparent referral bias documented in this study, with higher-risk patients (ie, more men, older patients, and those with a higher BMI) being referred for OGB. This referral bias is not simply a reflection of the early experience in this surgery program during the learning curve for laparoscopic procedures because a similar selection bias is confirmed in a review of 800 more recent operations since March 1, 2006. The more recent patients who have undergone LGB have tended to be younger ($P=.006$) and have a lower BMI ($P<.001$). However, their sex is no longer significantly different ($P=.23$). These observations suggest that the selection bias is a significant factor that must be considered when reviewing these results and those derived from administrative databases.[12]

In this study, our observed logistic regression model that found that sex, 10-year incremental increases in age, and increases in BMI by increments of 10 were not predictors of increased complications. Our findings, however, are not consistent with those of many other studies that have confirmed that patient age, male sex, and a high BMI are predictors of complications. Possible explanations for our findings include the relatively small size of this series compared with other risk analyses and the possibility that the preoperative weight loss may have attenuated the influence of these known risk factors with regard to surgical complication rates. In addition, we are aware that the logistic regression model may not eliminate all potential confounding issues inherent in a retrospective analysis.

To our knowledge, this is the first large trial that suggests an association between preoperative weight loss and improved bariatric surgery outcomes. This has traditionally been a controversial issue in bariatric surgery, with little available supporting evidence. Many bariatric surgeons mandate preoperative weight loss for selected high-risk patients. However, others strongly believe that mandated preoperative weight loss may be a deterrent to surgery for deserving patients because of factors such as loss of motivation for surgery, patient selection of other surgical programs that do not require preoperative weight loss, and the additional cost of medical weight loss in the face of failure of previous weight loss programs. During this study, the dropout rate from the preoperative program has been at the same rate as that during nonstudy years, and patient survey data indicate that the recommendation for preoperative weight loss is not a major contributor to patient drop-out rates.

Despite the proven physiologic changes that occur with even modest weight loss, only limited clinical evidence supports preoperative weight loss in bariatric surgery. Fris[10] demonstrated in 50 patients that a 2-week, preoperative, low-energy diet reduces liver size, presumably from loss of liver fat. Alvarado et al,[6] in a retrospective study that involved 90 patients, found all but 10 of the patients were able to lose 2.5% or more of body weight before bariatric surgery, with 36 patients having lost 7.5% to 23.8% before surgery. These investigators found that preoperative weight loss greater than 5% was associated with shorter operating times but was not associated with any difference in surgical complications. The authors also observed an association between preoperative weight loss and 1-year weight loss.

Similar findings were observed by the same investigators in a prospective, randomized trial in 100 patients who underwent LGB comparing 10% preoperative weight loss with no preoperative weight loss. Data were obtained from 61 patients (26 with preoperative and 35 with no weight loss). Operating time was shorter by 38 minutes ($P=.008$) and early postsurgery weight loss was greater in the patients who lost weight before surgery. As in the previous study, the absolute numbers of complications were low in this small study, and the authors found no association between preoperative weight loss and surgical morbidity.[7] In addition, the authors did not find that preoperative weight loss delayed bariatric surgery.

Riess et al[8] reviewed 353 bariatric patients, 74 of whom had been instructed to lose weight preoperatively because the surgeon had perceived a larger visceral-to-subcutaneous adipose tissue ratio. Those in the weight loss group were heavier ($P=.001$) and more likely to be men ($P=.001$). Complications were less frequent ($P=.04$) in the weight-loss patients.

The strengths of the current study include the large number of patients and the prospectively obtained preoperative weight loss data. Although the morbidity study was retrospective, those who reviewed the hospital records were purposely masked to the preoperative weight loss of the individual patients. Perhaps the most significant weakness of the study is that the parameter measured and linked to outcome is preoperative weight loss. Unmeasured factors that lead to weight loss, such as motivation, compliance, intellectual capability, social support, and economic status, are all possible explanations for weight loss and may be influential in the outcomes data measured. The findings in this study will require confirmation by a randomized, prospective trial.

Should one conclude from these results that preoperative weight reduction is indicated for all candidates for bariatric surgery? This remains a controversial issue because of the current mortality and major complication rates of bariatric surgery of less than 0.3% and less than 3%, respectively.[9] Mortality and major complications tend to occur in older patients, those with high BMIs, and men. Preoperative risk analysis as developed by DeMaria et al[1,2] allows for identification of additional high-risk patients. The excellent current results of surgery, especially in good-risk patients, are a strong argument against a cost benefit of routine preoperative weight reduction in bariatric surgery. Rather, this modality should be a consideration for high-risk bariatric surgery candidates. Used in this manner, this modality may prove to be cost-effective because it will likely increase patient access to bariatric surgery.

In conclusion, this study suggests that preoperative weight loss may be associated with a reduced risk of surgical complications associated with bariatric surgery. We hope that these findings will be confirmed by prospective, controlled trials and that bariatric surgeons will consider this modality for preoperative risk reduction in selected patients who are deemed high risk for complications after surgery.

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## INVITED CRITIQUE

# Slimming Down for Safer Surgery

Morbid obesity is a significant health problem for which bariatric surgery has been demonstrated to be the most effective and durable treatment. This surgery reduces excess body weight and improves comorbidities, satisfaction, and quality of life. The number of weight-loss operations performed yearly continues to escalate, and previously held limitations on patient selection—age, BMI, and presence of preoperative disease—are now being reconsidered because of the significant health benefits conferred by successful weight loss and treatment of the metabolic syndrome. Strategies to further improve outcomes after bariatric surgery are, therefore, of significant interest, because there is often less room for adverse events with morbidly obese patients than in patients with fewer comorbidities or those of healthy weight. Postoperative complications in the former population can be particularly difficult to manage and deadly. The authors retrospectively review data from hundreds of consecutive patients who had undergone an open or laparoscopic weight-loss procedure and demonstrate that complications can be reduced with aggressive preoperative weight loss.

While we try to provide accurate risk stratification information to patients, identification of the factors that do not portend poor outcomes is also important. In this article, neither age nor sex was an independent predictor of postoperative complications, although both previously have been identified as risk factors. That no correlation was demonstrated certainly could be the result of an underpowered study. One interesting interpretation of the finding advanced by the authors, however, is that preoperative weight loss attenuates previously iden-