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ORIGINAL CONTRIBUTIONS

Does Weight Gain During the Operation Wait Time Have an Impact on Weight Loss After Laparoscopic Sleeve Gastrectomy?

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Abstract
Background The effect of preoperative weight changes on postoperative outcomes after bariatric surgery remains inconclusive. The aim of the present study was to evaluate the effect of preoperative weight gain on postoperative weight loss outcomes after laparoscopic sleeve gastrectomy (SG).
Methods Ninety-two morbidly obese patients undergoing SG from January 2014 to April 2016 were separated into two groups according to whether they gained weight or not during the waiting time prior to surgery.
Results Thirty-nine patients (42.4 %) gained weight during the waiting time and 53 patients (57.6 %) did not. The median body mass index (BMI; kg/m^2) at surgery was significantly higher in weight-gained patients (47.8 (min-max, 40–62)) compared to patients who had not gained weight (45.10 (min-max, 41–67)), (P = 0.034). No significant difference was found between the two groups regarding the distribution of age, gender, family history of obesity, existence of comorbidity, smoking, weight gain during childhood or adulthood, preoperative Beck depression and Beck anxiety scores, waiting time period, and body weight at the initial visit ($P > 0.05$). The ASA I score was higher in weight-gained patients whereas ASA II score was higher in those who did not gain, and the difference was significant (P = 0.046). Postoperative % BMI loss and % weight loss were not significantly different between the two groups at the first, third, sixth months, and the end of the first year ($P > 0.05$).
Conclusion Weight gain during waiting time has no negative impact on % weight loss and % BMI loss after SG.

Keywords Sleeve gastrectomy · Morbid obesity · Weight loss

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Introduction

Sleeve gastrectomy (SG) is now the most commonly performed bariatric procedure worldwide [1]. The reasons for preferring SG over other bariatric procedures are its easier technique without the need for anastomosis; less need for supplementation of trace elements and vitamins; no risk of marginal ulcers or internal hernias; no foreign body insertion; and the avoidance of disadvantages of malabsorptive operations which cause dumping syndrome and diarrhea. Leak and mortality rates after SG and laparoscopic Roux-en-Y gastric bypass (LRYGB) are comparable [2]. SG provides a weight loss effect within the range between gastric banding and LRYGB [3–5].

Despite good success rates, insufficient weight loss or weight regain occurs in some patients after SG. Failure in weight loss is usually related to operator-dependent procedural error or poor adherence to prescribed lifestyle modifications [6, 7].

The aim of the present study was to evaluate the effect of preoperative weight gain during the waiting time prior to surgery on postoperative weight loss outcomes after SG.

Material and Methods

Following approval of the Local Ethical Board Committee of Bursa Yuksek Ihtisas Teaching and Research Hospital, data of morbidly obese patients (BMI ≥40 kg/m^2 or BMI >35 + two comorbidities) undergoing SG were retrospectively analyzed from January 2014 to April 2016. Body weight measurements

of each patient were recorded from initial visit to surgery, and then on the postoperative first, third, sixth months, and first year.

Patients were designated to one of the two groups according to whether they gained weight or not during the waiting time prior to surgery. The two groups were compared according to age, gender, family history, existence of comorbidity (hypertension, diabetes mellitus, chronic obstructive lung disease), smoking, ASA score, preoperative Beck depression scores (Beck depression inventories -IA and -II) [8], preoperative Beck anxiety scores [9], weight gain during childhood or adulthood based on patient's self report, waiting time period and body weight at the initial visit, weight at surgery, and postoperative % weight loss with body mass index loss (BMIL) on the first, third, sixth months, and first year.

All patients underwent preoperative upper endoscopy, abdominal ultrasound, chest radiography, electrocardiography, and breathing function test, and had consultations with endocrine, chest, and psychiatry departments. Patients were considered to be on the wait list from the time the referral was received and were evaluated a second time with the results of the laboratory tests, and consultations. After the initial visit, patients were also referred to the dietitian for low caloric dietary intake during the waiting period. Neither a liquid protein diet nor a specific diet protocol for super-obese patients was preoperatively implemented.

After an informed consent was obtained, a standard SG was performed in each patient using 36 French bougie, preserving a close distance of 4 to 6 cm from the staple line to the pylorus.

Statistical Analysis

Data analysis was performed using SPSS 19 software. The distribution of continuous variables was investigated using the Shapiro-Wilk test. Descriptive statistics for continuous variables were shown as mean ± standard deviation or median (minimum-maximum) and categorical variables were shown as the number and percentage of cases. Student's *t* test was used to determine any significant difference between the groups for mean values, and the Mann-Whitney *U* test was used for median values. Categorical variables were assessed by Pearson's chi-square test and Yates' corrected chi-square test. A *P* value of <0.05 was considered as statistically significant.

Results

Between January 2014 and April 2016, 92 patients underwent SG. Thirty-nine patients (42.4 %) gained weight during the wait time compared to 53 patients (57.6 %) who did not. The mean wait time for surgery was 4.83 ± 2.5 months. No significant difference was found between the two groups regarding the distribution of age, gender, family history of obesity, existence of comorbidity, smoking, preoperative Beck depression and Beck anxiety scores, weight gain during childhood or adulthood, waiting time period, and body weight at the initial visit ($P > 0.05$). The ASA I score was higher in weight-gained patients whereas ASA II score was higher in those who did not gain, and the difference was significant ($P = 0.046$) (Table 1).

Table 1 Patient's characteristics

From initial visit to surgery	Weight gain (+)	Weight gain (−)	*P* value
Patients (*n*)	39 (42.4 %)	53 (57.6 %)	
Age	36.28 ± 7.64	36.19 ± 9.10	0.959
Gender (male/female)	7/32	10/43	0.911
Family history	25 (64.1 %)	31 (58.5 %)	0.586
Weight gain period			0.872
Childhood	22 (56.4 %)	29 (54.7 %)	
Adulthood	17 (43.6 %)	24 (45.3 %)	
Comorbidity	8 (20.5 %)	15 (28.3 %)	0.394
Smoking	11 (28.2 %)	11 (20.8 %)	0.338
Preoperative Beck depression score	12.6 ± 7.3	12.1 ± 7.82	0.734
Preoperative Beck anxiety score	12.4 ± 11.3	13.3 ± 10.6	0.582
Preoperative waiting period (month)	4 (1–12)	4 (1–12)	0.997
Weight at initial visit (kg)	125 (99–174)	129 (94–189)	0.591
BMI (kg/m^2) at initial visit	45.5 (35.3–64.5)	45.2 (40.3–66.6)	0.535
Weight at surgery (kg)	132 (104–183)	128 (94–177)	0.136
BMI (kg/m^2) at surgery	47.8 (40–62)	45.10 (41–67)	0.034
ASA score			0.046
1	24 (61.5 %)	21 (40.4 %)	
2	15 (38.5 %)	31 (59.6 %)	

BMI body mass index, *kg* kilogram, *m* meter

Table 2 Comparison of the groups according to postoperative % BMIL and % weight loss

From initial visit to surgery	Weight gain (+) (n = 39)	Weight gain (−) (n = 53)	P value
% BMIL			
First month	11.7 %	10.3 %	0.058
Third month	21.2 %	20.4 %	0.458
Sixth month	29.5 %	29.2 %	0.862
Twelve month	35.4 %	34.7 %	0.726
% weight loss			
First month	11.7 %	10.2 %	0.054
Third month	21.1 %	20.4 %	0.492
Sixth month	29.3 %	29.2 %	0.898
Twelve month	35.3 %	34.6 %	0.749

BMI body mass index, *% BMIL* percentage of body mass index loss

Although similar at initial visit, the median body mass index (BMI; kg/m^2) at surgery was significantly higher in weight-gained patients (47.8 (min-max, 40–62)) compared to patients who had not gained weight (45.10 (min-max, 41–67)) (P = 0.034). Postoperative % BMIL and % weight loss were not significantly different between the two groups at the first, third, sixth months, and the end of the first year (P > 0.05) (Table 2) (Fig. 1).

Discussion

SG is a restrictive bariatric procedure in which weight loss is based on the reduction of gastric volume to that of a small gastric tube. The greatest weight loss is achieved in the first year, especially during the first 6 months [10]. However, some patients complain of weight regain usually during the second post-op year [11]. Possible factors for operative failure include the use of a larger gastric tube for calibration of the stomach and incomplete sectioning of the gastric fundus [12–14]. Removal of the entire gastric fundus is crucial for reducing stimulation of the appetite. Langer and his colleagues found stable low ghrelin levels up to 6 months after SG [15, 16]. This accounts for the excess weight loss in the early postoperative period. In the present study, a standard SG was performed on all patients by a single surgeon. Calibration of the stomach was provided with a 36-French gastric tube. The left crus of the diaphragm was routinely visualized, and the posterior attachments to the stomach were released. A close distance of 4 to 6 cm from the staple line to the pylorus was preserved. Despite the use of the appropriate technique, a failure to lose weight in some patients led us to consider personality disorders and unregulated eating behavior.

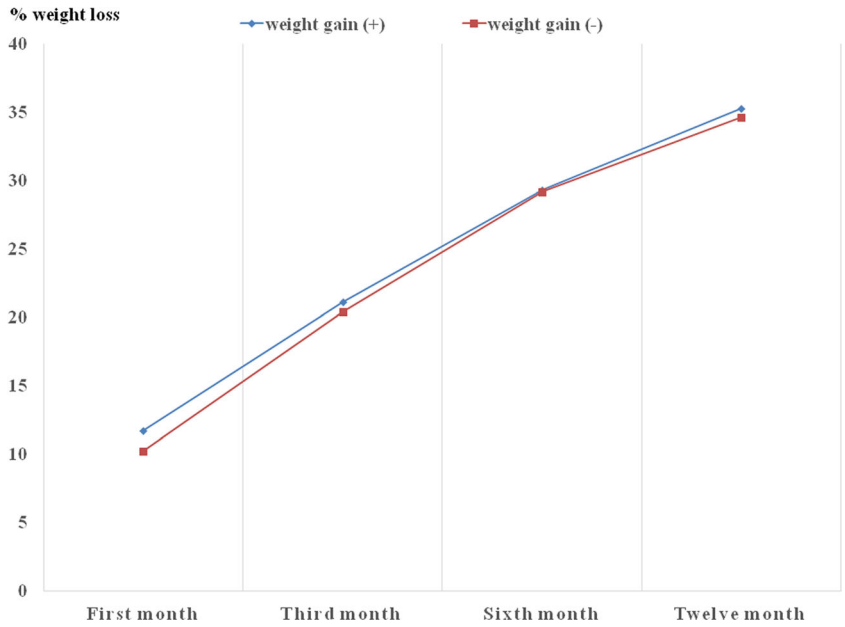

Fig. 1 Weight loss percentiles of the groups during the 1-year follow-up

Psychiatric disorders, mood disorders, anxiety, alcohol use, and drug addiction have been found more frequently in bariatric surgery candidates than in the controls [17, 18]. In the present study, we had similar Beck depression and Beck anxiety scores in patients who gained weight prior to surgery as those who had not. Thus, no clear relationship could be found between presurgical psychiatric disorders and postoperative weight loss variations. This finding is also supported in the study by Thonney et al. [19], who found no connection between psychological factors assessed in patients prepared for bariatric surgery and their postoperative weight loss. On the other hand, a few studies have indicated depression as a negative predictor for weight loss [20–22].

Recently, several studies have focused on eating behavior disorders. Colles et al. [23] found that uncontrolled eating after surgery was associated with less weight loss and elevated physiological distress. Similarly, Burgmer et al. [24] claimed that postoperative but not preoperative eating behavior had a predictive value for the extent of weight loss after gastric restrictive surgery. In the study by Kruseman and his colleagues [25], they recommended that eating behavior should be screened not only before but also in the postsurgical period. Considering the results of the present study, we are also in the opinion that weight control before surgery is vital and as important as that after surgery.

Contradictory results have been reported in the literature about the predictive value of preoperative weight change on postoperative weight loss [22–28]. These studies are mainly focused on preoperative weight loss and its effect on postoperative outcomes. The study by Sherman et al. [29] evaluated both preoperative weight gain patients and weight loss patients; they found no statistical difference in postsurgical % weight loss at 1 year. Results of the present study indicate that weight gain during waiting time has no negative impact on % weight loss after SG.

The mean wait time for SG in our clinic was 4.83 ± 2.5 months and is gradually increasing due to the rise in patient demand. It is likely that many of our obese patients lost control over their eating habits and gained weight during this waiting period expecting to rectify the situation after surgery. However, all morbidly obese patients should be given periodic support to help with weight control using a behavioral and cognitive program both before and after surgery.

The present study has some limitations. Firstly, the sample size is small. Secondly, it is retrospective in nature. On the other hand, in contrast to several studies which focused on preoperative weight loss and its effects on postoperative outcomes, we have evaluated the effects of preoperative weight gain. This report describes the 1-year outcomes, but the study continues and long-term results are underway.

In conclusion, preoperative weight gain during the waiting time does not have a negative impact on postoperative % weight loss. However, the eating habits of morbidly obese patients should be closely monitored preoperatively. If possible, these patients should be prepared more extensively for lifestyle modifications both before and after surgery which may raise the success rate.

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Compliance with Ethical Standards

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Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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