

# Noncompliance with Behavioral Recommendations Following Bariatric Surgery

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**Background:** Bariatric surgery has been increasingly utilized for treatment of severe obesity. Although initial weight loss following surgery is almost completely assured, little is known about long-term outcome and patient compliance with post-surgical behavioral recommendations for diet and exercise that would improve outcome. The purpose of this study was to examine the rate of noncompliance with behavioral recommendations and to identify the incidence of psychological concerns following bariatric surgery.

**Method:** Subjects were identified from an active clinical data-base of prospective clinical follow-up of all bariatric surgery patients. 100 consecutive patients who underwent Roux-en-Y gastric bypass were identified, and a chart review was conducted at 6 and 12 months postoperatively to gather demographic data and identify the prevalence of noncompliance identified in monthly follow-up visits. Also, patients were asked about depression, relationship/sexual concerns, and medical complications.

**Results:** 81 women and 19 men were followed for 1 year. The majority of patients reported noncompliance in at least one area, with lack of exercise and snacking being most frequently cited (41%, 37% respectively overall). Most patients were compliant with eating protein first and avoiding sodas. At 12 months follow-up, 12% reported depression, 4% reported sexual concerns and 2% reported relationship problems. Also, 9% reported having experienced some medical complication related to their surgery.

**Conclusion:** Noncompliance with behavioral recommendations is pervasive following bariatric surgery, with lack of exercise being the most likely area of noncompliance. Because of the importance of

compliance with behavioral recommendations for the successful outcome of bariatric surgery, further research is warranted to further clarify the factors that impact long-term outcome and to design interventions to improve compliance.

*Key words:* Noncompliance, morbid obesity, gastric bypass, bariatric surgery, eating behavior

## Introduction

Morbid obesity is defined as a body mass index (BMI) of  $>35 \text{ kg/m}^2$ .<sup>1</sup> Treatment of morbid obesity is necessary because excessive weight is closely associated with the co-morbid conditions of adult onset diabetes, heart disease, sleep apnea, hypertension, joint pain and hyperlipidemia.<sup>2-4</sup> However, the treatments which are often effective for mild to moderate obesity, such as low calorie diets, are usually ineffective for severe or morbid obesity.<sup>5</sup> Because of the difficulty in achieving massive amounts of weight loss, the NIH has recommended surgical treatment for morbidly obese patients who have failed at previous attempts at medical management using behavior modification, diet pills and diet programs.<sup>1,6</sup> Therefore, bariatric surgery has been increasingly utilized for treatment of severe obesity.<sup>7-9</sup> Numerous studies have documented the physiological benefits of bariatric surgery for the morbidly obese,<sup>10</sup> and most patients report improved psychosocial functioning following bariatric surgery.<sup>11-14</sup> Weight loss is almost completely assured during the first 3 months after the

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gastric bypass procedure. However, the more long-term outcome can vary a great deal.<sup>15</sup> For example, it has been demonstrated that noncompliance with recommendations regarding eating behavior after surgery is associated with eventual weight gain.<sup>16</sup> Because food intake and exercise determines weight change after bariatric surgery, patients are usually given a number of behavioral recommendations to follow after surgery. These recommendations include: avoid snacking, avoid drinking sodas, increase water intake, avoid alcohol, take vitamins, eat protein, exercise, avoid high fat foods, and avoid binge eating. However, little is known about the rate of compliance with these recommendations.

It is important to identify the prevalence and areas of noncompliance in order to design interventions to increase compliance and improve outcome. The role of psychological factors in determination of long-term outcomes is well recognized,<sup>6,17-19</sup> and psychological difficulties before surgery are common.<sup>20-22</sup> For example, in a study of 153 consecutive referrals for bariatric surgery, Gertler and Ramsey-Stewart<sup>23</sup> diagnosed psychopathology in 58% of the patients and another 9% had uncertain motivation and ambivalence about their planned surgery. In another study, Kalarchian and colleagues<sup>24</sup> identified that nearly 20% of bariatric surgery patients would meet the diagnostic criteria for binge-eating disorder.

Gastric bypass patients with disturbed eating behaviors before surgery may be at risk of returning to old patterns postoperatively. For example, Saunders<sup>25</sup> observed that many patients report feelings of loss of control over eating after bariatric surgery and in some cases weight gain after several years. Although no longer able to eat large amounts of food, "grazing" was identified as a more common pattern, usually appearing  $\geq 6$  months following surgery, indicating that the different forms of overeating need to be assessed in patients receiving bariatric surgery. Also, some patients may experience increased depression or marital concerns after surgery.<sup>26-28</sup>

Therefore, the purpose of this retrospective chart review was to examine the incidence of noncompliance with behavioral recommendations and to identify the incidence of psychological concerns following bariatric surgery at 6 and 12 months postoperatively.

## **Methods**

### **Subjects**

This study was approved by our Institutional Review Board on May 3, 2002. Subjects were identified from an active clinical data-base of prospective clinical follow-up of all bariatric surgery patients. We identified 100 consecutive patients who had Roux-en Y gastric bypass (RYGBP) for weight-related medical problems. The patients consisted of 81 women and 19 men with a mean age of 43.6 years. Their median preoperative weight was 139.8 kg and BMI was 49.0. All of the patients completed an extensive preoperative assessment by a multidisciplinary team including dietitian, endocrinologist, psychologist, and surgeon.

All of the patients reported having tried previous non-surgical attempts at weight reduction. Indeed, all of the patients reported three or more attempts at long-term behavior modification without success, and the majority (88%) reported weight gain in the 12 months preceding consideration of bariatric surgery. Prospective surgery patients were provided with individual counseling that explained the operation, its rationale, and the changes in lifestyle and eating habits to be followed after surgery. In addition, all of the patients completed a 6-month diet counseling program before consideration for surgery that included recommendations for restricting fat and calories and to begin an exercise program. Weight was monitored at each monthly visit. In addition, the patient was given an opportunity to ask questions about behavioral changes that were recommended to achieve the above goals.

A psychological evaluation was completed by all of the patients before surgery. Patients were evaluated for symptoms of depression, anxiety, psychosis, cognitive impairment, marital problems, substance abuse, eating disorders, and personality disorder. Also, patients were asked about any history of physical or sexual abuse, current social support, lifestyle changes, outcome expectations, and motivations.<sup>29</sup> The bariatric surgery was undertaken only after the psychological evaluation and any recommendations were completed. Our clinical practice is: to require at least 12 months of abstinence for substance abuse; to require a stable on-going relationship with a psychiatrist or psychologist for

at least 12 months for a thought disorder, post-traumatic stress disorder, or borderline personality disorder; at least 3 months to reassess if treatment for a mood disorder has been effective; and require at least 12 months of abstinence from any purging behavior. These guidelines for exclusion are similar to those reported by other researchers.<sup>29-32</sup>

## Surgery

All patients underwent disconnected RYGBP.<sup>33</sup> This procedure involves creating a very small proximal gastric pouch of about 20 ml from the pre-existing stomach and attaching a 75-cm Roux-en-Y limb of the proximal jejunum to it. The remaining part of the stomach is divided and bypassed.<sup>34</sup>

Patients underwent additional dietary counseling provided by a bariatric nurse practitioner (NP) before discharge from the hospital. Patients were discharged with instructions to eat two meals per day of clear liquids only and drink 64 ounces of water a day. A detailed dietary pamphlet explaining the progression to gradually advance to regular food over the next 3 months was provided. Instructions included: eat protein first, drink 64 ounces (about 2000 ml) of water per day, avoid snacking, avoid drinking sodas, avoid alcohol, take vitamins, avoid high fat foods, exercise 1 hour per day, and no binge eating. Patients were also offered a bi-monthly outpatient support group at no charge for up to 1 year after surgery.<sup>35</sup>

## Follow-up

Patients completed follow-up visits with a surgeon or bariatric nurse practitioner at 1 week, 2 weeks, 1 month, and then every other month for 1 year post-surgery. Patients were contacted by phone or mail to re-schedule any missed appointments. Complete follow-up data were available for 100 patients at 6 months and 92 patients at 12 months. At each visit, the patient received dietary counseling, previous dietary recommendation, recommendations for exercise were reinforced, and patients reported on their compliance with recommendations. Weight and BMI were obtained at each visit. In addition, patients were asked if they had any depression, relationship/sexual concerns, or medical complications.

Also, patients were asked about alcohol use and any substance abuse. Psychiatric referral or medical consultation was made as needed.

We completed a retrospective chart review of the consecutive patients who completed bariatric surgery at Scott and White Clinic and Hospital at 6 and 12 months post-surgery. The chart review included review of clinic visit notes to gather demographic data and identify the prevalence of noncompliance that was identified in monthly follow-up visits. Specifically, charts were reviewed for compliance with the following recommendations: avoid snacking, avoid drinking sodas, adequate water intake, avoid alcohol, take vitamins, eat protein first, avoid high fat foods, exercise, no binge eating, sexual concerns, and relationship concerns. All data were coded to protect the patient's name and identity. Data were coded on to biostatistics forms and analyzed by an individual who was uninvolved in the data collection.

## Results

Data on 100 bariatric surgery patients followed for 1 year were used in the analysis. Data collected included demographic information, compliance with behavioral recommendations, and any psychological or medical complications at 6 and 12 months.

Data was analyzed using descriptive statistics to obtain mean, standard deviations, and frequencies. Paired sample t-tests were conducted for between-group comparisons at 6 and 12 months. Demographic data included gender, age at time of bariatric surgery, education, and occupation (Table 1). Medical data included pre-surgery weight and weight loss at 6 and 12 months. Medical data also included pre-surgery BMI, and BMI at 6 and 12 months (Table 2).

The percentage of noncompliance with behavioral recommendations was calculated for 6 and 12 months. Results indicated that percentage of non-compliance at 6 and 12 months respectively was as follows: snacking (44% and 37%); drinking sodas (4% and 2%); not increasing water intake (14% and 7%); drinking alcohol (0% and 0%); not taking vitamins (7% and 11%); not eating protein first (7% and 1%); eating fatty foods (3% and 3%); not exercising (40% and 41%); binge eating (0% and 0%); and not

**Table 1.** Demographic data

AGE	(mean) 43.6 years
<b>GENDER</b>	(%)
Female	81
Male	19
<b>LEVEL OF EDUCATION</b>	
High school grad/GED	62.4
Business/Technical School	6.5
1 to 3 years College	7.5
College Degree	22.6
Postgrad degree	1.1
<b>OCCUPATION</b>	
Professional/Technical	18.2
Managerial/Sales	10.2
Craftsman/Skilled	29.5
Unskilled Labor	5.7
Clerical	15.9
Student	2.3
Housewife	9.1
Retired	6.8
Other	2.3

attending support group (21% and 25%) (Table 3). There was a significant statistical difference between 6 and 12 months rates of non-compliance for increased water intake and consistently eating protein first at meal times, reflecting an improvement at 12 months.

The percentage of psychological and medical complications was calculated for 6 and 12 months. Results indicated percentage of complications at 6 and 12 months respectively was as follows: depression (9% and 12%); sexual concerns (3% and 4%); relationship concerns (2% and 2%); and medical complications (41% and 9%) (Table 4). There was a significant statistical difference between 6 and 12 months rates of medical complications with a decrease in frequency of medical complications at 12 months follow-up.

**Table 2.** Pre- and postoperative weight loss and BMI

Weight Loss	Pre-surgery weight	6 months	12 months
	Mean=312.63 (SD=60.62)	Mean=92.38 (SD=26.04)	Mean=116.57 (SD=39.24)
BMI Change	Pre-surgery BMI	6 months	12 months
	50.53	Mean=15.62 (SD=5.27)	Mean=18.64 (SD=5.26)

**Table 3.** Percentage of noncompliance with behavioral recommendations

Noncompliance	% at 6 months	% at 12 months
Snacking	44	37
Drinking Soda	4	2
Not Drinking		
Recommended Water	14	7*
Drinking Alcohol	0	0
Not Taking Vitamins	7	11
Not Eating Protein First	7	1**
Eating Fatty Food	3	3
Not Exercising	40	41
Binge Eating	0	0
Not Attending		
Support Group	21	25

\**P*<.05; \*\**P*<.01.

## Discussion

Bariatric surgery is increasingly utilized for treatment of severe obesity,<sup>7-9</sup> and when preformed on appropriate candidates it can be successful in bringing about significant weight loss that can be maintained for 10 years or longer.<sup>10</sup> Of equal importance is that in clinical practice the weight loss achieved by patients having the same surgery is quite variable, especially several years after surgery.<sup>36</sup> Virtually all patients experience weight reduction during the first months following bariatric surgery. It has been suggested that bariatric surgery may be conceptualized as a “forced behavior modification” during the first few months after surgery. However, as time passes following surgery, the patient’s ability to voluntarily comply with behavioral recommendations becomes of significant importance. However, the prevalence of compliance with recom-

**Table 4.** Percentage of psychological and medical complications

Complications	% at 6 months	% at 12 months
Depression	9	12
Sexual Concerns	3	4
Relationship Concerns	2	2
Medical Complications	41	9*

\**P*<.001.

recommendations for change in diet and exercise has received limited study.

The purpose of the present project was to examine the frequency of noncompliance at a 6-month and 12-month follow-up. We found that at both 6 and 12 months, snacking and recommendations to exercise suggested the greatest degree of noncompliance of all the behavioral recommendations. Of the individuals surveyed, 44% were noncompliant with instructions to avoid snacking at 6 months, but decreased to 37% noncompliance at 12 months. At 6-month follow-up, 40% of the individuals surveyed were noncompliant with recommendations to exercise. This increased to 41% at 12 months. Patients were most compliant with the recommendation to avoid alcohol, with reported 100% compliance at both 6 and 12 months. There was a significant statistical difference between 6 and 12 months rates of non-compliance only for increased water intake and consistently eating protein first at meal times reflecting an improvement at 12 months.

Most patients did not experience psychological complications; however, there was a slight increase in reported depression at 12 months. Forty-one percent of patients experienced some medical complications (i.e. nausea, infection, etc.) within the first few months after surgery. There was a significant statistical difference between 6 and 12 months rates of medical complications, with a decrease in frequency of medical complications at 12 months follow-up. However, there was a marked decrease at 12 months, with only 9% reporting any type of medical complications at 1 year post-surgery.

It should be noted that the present research utilized a clinical sample in which patients who were continuing to experience significant psychopathology were not recommended for surgery. The limitation of using a clinical sample has been noted by other researchers.<sup>37</sup> In our program, we followed the previously described recommendations of Clark and colleagues<sup>36</sup> to exclude patients with <12 months abstinence from substance abuse or purging behavior and for patients with thought disorder or severe personality disorder to be in a stable and successful relationship with a mental health provider. Patients with severe mood disorder were referred for treatment and reassessed before being scheduled for surgery. The present results are therefore limited to patients who meet these screening criteria.

It should be noted that, the conclusions from the present study are drawn from a primarily suburban and rural (central Texas), Caucasian population. The study is therefore limited by a lack of ethnic diversity; future research should be conducted with different populations and geographic settings. Also, the present investigation did not examine the potential role of marital dissatisfaction, abuse, stress, or social support. Because previous studies have suggested that these factors may potentially influence weight loss and adjustment following surgery,<sup>38</sup> additional research is needed to examine these factors as related to behavioral compliance. Also, because the present research was limited to 12-month follow-up, more long-term follow-up data is needed to determine compliance at 5-10 years post-surgery.<sup>39</sup>

In summary, we examined noncompliance at 6 and 12 months after surgery in a sample of patients who received RYGBP surgery. The majority of patients reported noncompliance in at least one area, with lack of exercise and snacking being most frequently cited. Also, a minority of patients were identified as having emotional or relationship problems. Further research is warranted to examine the impact of these factors on long-term outcomes and to design interventions to improve compliance following bariatric surgery.

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