

Psychosocial and Behavioral Aspects of Bariatric Surgery

David B. Sarwer, Thomas A. Wadden, and Anthony N. Fabricatore

Abstract

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Bariatric surgery has become an increasingly popular treatment option for individuals with extreme obesity (defined as a BMI ≥ 40 kg/m²) or those with less severe obesity accompanied by significant comorbidities. Sustained postoperative weight loss and improvements in obesity-related health problems make bariatric surgery the most effective treatment for this population. Nevertheless, most experts agree that psychosocial and behavioral factors contribute to successful postoperative outcomes. This paper reviews the literature on the preoperative psychosocial status, eating behaviors, and quality of life of patients who seek bariatric surgery. In addition, the paper examines studies that investigated changes in these factors postoperatively. The review concludes with an agenda for future research in this area.

Key words: bariatric surgery, extreme obesity, psychosocial status, eating behavior, quality of life

Introduction

Obesity has quickly become one of the most significant health problems in many westernized countries. Presently in the United States, 33.2% of women and 27.6% of men have a BMI of ≥ 30 kg/m² (1). Furthermore, 6.4% of women and 3.3% of men suffer from extreme obesity, defined as a BMI ≥ 40 kg/m². From 1986 to 2000, the prevalence of obesity in the United States doubled. During that same time, the prev-

alence of extreme obesity quadrupled (2). Millions of individuals worldwide suffer health complications associated with extreme obesity, including coronary heart disease, hypertension, non-insulin-dependent diabetes, and osteoarthritis (3–5).

There are few effective weight control options for persons with extreme obesity, save bariatric surgery. Comprehensive behavior modification programs, as well as pharmacological treatments (principally orlistat and sibutramine), typically produce an 8% to 10% reduction in initial weight (6–11). Weight regain after treatment discontinuation is often significant (10–12). These modest outcomes may improve the health and psychosocial status of those with moderate obesity but probably have little effect on the health and well being of those with extreme obesity. Thus, bariatric surgery has become a more popular treatment option for those with extreme obesity or those with a BMI ≥ 35 kg/m² in the presence of significant obesity related comorbidities.

Current surgical procedures include gastric restriction and gastrointestinal bypass (GBP).¹ Restrictive operations include vertical banded gastroplasties (VBG) and circumgastric adjustable banding. GBP operations also have a restrictive component and are believed to affect hormones (e.g., ghrelin) involved in the regulation of body weight. Both types of operations now can be performed laparoscopically, which may be associated with improved perioperative outcomes (13).

Two years postoperatively, patients have typically lost 50% to 60% of excess body weight with GBP and 40% to 50% with the restrictive procedures (13–15). Although randomized control trials are rare, at least three have shown significantly greater weight losses with GBP compared with VBG (16–18). Weight regain often begins at ~ 2 years postoperatively and is estimated at 15% of the maximum weight loss (16,19,20). Pories et al. (20) found an average reduction of $\sim 30\%$ of the initial body weight in a small number of GBP patients followed for up to 14 years. In

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Weight and Eating Disorders Program, Department of Psychiatry, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania.

Address correspondence to David B. Sarwer, Weight and Eating Disorders Program, 3535 Market Street, Suite 3022, Philadelphia, PA 19104-3309.

E-mail: dsarwer@mail.med.upenn.edu

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¹ Nonstandard abbreviations: GBP, gastrointestinal bypass; VBG, vertical banded gastroplasty; SOS, Swedish Obese Subjects; MMPI, Minnesota Multiphasic Personality Inventory; BED, binge eating disorder; NES, night eating syndrome.

contrast, the Swedish Obese Subjects (SOS) study (which primarily examined the effects of restrictive procedures) found an average loss of 16% of initial body weight at 10 years (21). (Please note that results from studies of both procedures are combined throughout the rest of the review, except where noted.)

Weight loss after surgery is associated with significant improvements in obesity-related comorbidities (19–23). The impressive health benefits, however, must be balanced by the incidence of complications. Early postoperative complications occur in 5% to 10% of patients, whereas late complications, including anemia and B₁₂ deficiency, have been reported in at least 25% of patients (20,24). The mortality rate is thought to be ~1% (20,25,26).

Furthermore, a minority of patients, perhaps as great as 20%, fail to lose a significant amount of weight (18,27). Failure to lose weight, as well as weight regain within the first 2 postoperative years, are typically attributed to poor adherence to the postoperative diet (17,18,28–31). Untoward events, such as vomiting and gastric dumping, have been reported in one- to two-thirds of patients (29,30,32). Vomiting and dumping are thought to result from overeating or from consuming foods high in sugar, which are not recommended in the postoperative diet. Thus, despite the impressive strength of bariatric surgery as a treatment for obesity, psychosocial and behavioral factors likely play an influential role in postoperative outcome.

This paper will review the psychosocial and behavioral aspects of persons who undergo bariatric surgery. We begin by reviewing studies that have investigated patients' preoperative psychosocial status. This includes a detailed overview of psychiatric comorbidity, eating behavior, and quality of life. We then turn to studies that have investigated changes in these domains postoperatively. The paper concludes with a detailed agenda of future research priorities.

Preoperative Studies of Psychosocial Status, Eating Behavior, and Quality of Life

Psychosocial Status

Extreme obesity is associated with significant psychiatric comorbidity. Studies that have conducted clinical interviews of bariatric surgery patients have suggested that 20% to 60% of patients suffer from an Axis I psychiatric disorder preoperatively (33–39). The lifetime history of an Axis I disorder has been reported to be as high as 70% (35). Mood disorders, such as major depressive disorder and dysthymia, are the most common conditions (33,34,37–41). Anxiety disorders, including generalized anxiety disorder and social phobia, have been diagnosed in up to 48% of candidates (33,34,38,41). Sizable minorities have been diagnosed with substance abuse disorders (33,41–43). Based on clinical interviews and DSM diagnostic criteria, up to 72% of patients have been diagnosed with personality disorders

(33,35,36,38,44). The most common diagnoses were histrionic, borderline, schizotypal, and passive-aggressive personality disorders (33,44).

Other studies have provided additional information on the preoperative psychosocial status of patients. Surgery candidates reported greater depressive symptoms compared with those with less extreme obesity (43,45). Among surgery candidates, greater depressive symptoms were typically found in younger candidates, women, and those with a poor body image (46), impairments in health-related quality of life (47), or a history of severe binge eating (48). Approximately 25% of bariatric surgery patients reported treatment from a mental health professional at the time of surgery (38–48), and 12% to 38% reported using psychiatric medication(s) (35,46,48,49). Between 3% and 20% of surgery candidates have been excluded from surgical treatment because of psychiatric complications (34,39,48,50,51), although one older study excluded 50% (52).

Several investigators have used the Minnesota Multiphasic Personality Inventory (MMPI) to study the personality characteristics of prospective patients. Based on a discriminant function analysis of MMPI scores, 44% of patients were classified as “well functioning”; 31% were categorized as “neurotic” (depressed and socially anxious); and 25% were categorized as character disordered (53). A subsequent study identified four groups of patients: 52% with modest elevations on the Hypochondriasis and Hysteria subscales, suggestive of a somatoform disorder; 20% with high scores on the Psychopathic Deviate subscale; 17% with scores characterized as “well functioning”; and 11% with elevations on six subscales (Hypochondriasis, Depression, Hysteria, Psychopathic Deviate, Psychasthenia, and Schizophrenia), who were described as “emotionally disturbed” (54). Barrash et al. (55) found that the majority of patients fit into 1 of 10 clinical profiles. Based on a large national sample of bariatric surgery patients, ~10% scored in the clinical range on all MMPI subscales except Masculinity-Femininity and Hypomania (42).

Collectively, these studies suggest a high rate of psychopathology among bariatric surgery candidates. These results, however, must be viewed with caution because of a variety of methodological limitations (43,56). Several studies used unspecified clinical interviews to assess the presence of psychopathology. Some used DSM diagnostic criteria to make diagnoses; others did not specify the diagnostic criteria. Several studies focused on current psychiatric diagnoses, whereas others based results on both current and lifetime occurrence of disorders combined. Relatively few included an appropriate control or comparison group. These methodological issues likely account for the wide range of psychopathology reported. Nevertheless, it seems that a significant minority of bariatric surgery patients have some form of psychopathology.

The relationship between extreme obesity and psychopathology is complicated. It is unclear whether psychopathology is a cause or consequence of extreme obesity. Anecdotal reports suggest that some individuals may eat excessively as a maladaptive coping mechanism for psychological problems, thus contributing to obesity. For others, the detrimental health effects and social stigma of extreme obesity may contribute to a mood or anxiety disorder in an otherwise psychiatrically healthy individual. Alternatively, some display no psychopathology.

Perhaps more importantly, the impact of preoperative psychiatric status on postoperative outcome is unclear. Some experts believe that psychiatric comorbidity, with the exception of uncontrolled substance abuse, does not contraindicate bariatric surgery (57). Others have suggested that patients with psychopathology should not be operated on without concurrent psychiatric treatment (20). The lack of consensus may be attributed to the relative absence of methodologically sound studies. Future research will need to address the methodological limitations of previous studies to establish the relationship between psychopathology and postoperative outcome. Large, prospective studies that include widely used, standardized assessment methods, such as the Structured Clinical Interview for DSM Disorders (a structured clinical interview considered the “gold standard” method to assess psychopathology), and that follow patients for several years are needed to best characterize this relationship.

Eating Behavior

There has been relatively little study of the general eating behaviors of bariatric surgery patients. At least two studies used the Eating Inventory (58) to assess cognitive restraint, disinhibition, and hunger. Preoperatively, bariatric surgery candidates reported increased levels of disinhibition and hunger and lower levels of restraint compared with norms for the measure (49) or with obese controls (59).

Several studies have examined the rate of binge eating disorder (BED) among surgery candidates. BED is characterized by the consumption of an objectively large amount of food in a brief period of time (e.g., 2 hours), with the patient’s report of subjective loss of control during the overeating episode (60,61). (Patients do not engage in a compensatory behavior, such as vomiting, laxative abuse, or excessive exercise, after the binge episode, which distinguishes BED from bulimia nervosa.) Approximately 10% to 50% of surgery patients are thought to suffer from BED preoperatively (35,62–65). The lack of agreement can be attributed to the use of different (and often suboptimal) methods to assess binge eating, as well as the use of small sample sizes in several studies. More recent studies have typically found rates between 10% and 27% (40,41,43).

Up to 40% of surgery patients have been characterized as having features of night eating syndrome (NES) (65,66).

NES is currently believed to consist of four core symptoms: morning anorexia, evening hyperphagia, nocturnal awakenings, and eating during waking episodes (67). Although not a formally recognized psychiatric diagnosis at present, preliminary data suggest that the eating patterns of persons with NES are distinct from those seen in other eating disorder diagnoses (68). Unfortunately, current incidence and prevalence data for this syndrome are unreliable because of the varying criteria used to define the condition and because of the limitations of small samples.

Similar to the studies of psychosocial status, the majority of studies of eating behavior suffer from methodological problems. Formal diagnostic criteria, or structured assessments of disordered eating, have been regularly used only in the most recent studies. Postoperatively, use of the formal criteria is problematic, because patients are unable to eat the large amount of food necessary for the diagnosis. It may be that the experience of a loss of control is the more accurate marker of binge eating among persons who have undergone bariatric surgery, although this awaits further discussion and study. Preliminary reports have suggested an increased rate of NES among surgery candidates. The prevalence of NES, and its relationship to postoperative outcome, should be studied further with the most comprehensive measures available.

Quality of Life

Extreme obesity clearly is associated with reduced health-related quality of life. Numerous studies that used the Medical Outcomes Study 36-Item Short Form Survey have found a positive relationship between BMI and physical limitations, bodily pain, and fatigue (41,47,69–72). Bariatric surgery candidates have been found to score significantly lower than the norms on most, if not all, of the eight subscales of the measure (73,74); they did not differ on the role functioning and emotional factors subscale in the study by Choban et al. (73).

Not surprisingly, surgery candidates report increased dissatisfaction with their body image (i.e., their internal representation of their outward appearance) compared with population norms (75). Surgery patients frequently report unsatisfactory marital relationships and difficulties with sexual functioning (76–78). Studies in both of these areas have been relatively small and frequently have failed to include control groups. Furthermore, studies have not consistently used the most valid and reliable measures of body image, marital satisfaction, and sexual functioning. The next generation of studies in these areas should strive to include appropriate psychometric measures such as the Multidimensional Body-Self Relations Questionnaire, Body Shape Questionnaire, Dyadic Adjustment Scale (to assess marital satisfaction), and Female Sexual Function Index.

Predictors of Postoperative Weight Loss

Several demographic characteristics are associated with greater postoperative weight loss. Whites have been found to lose more weight than persons from minority groups (18,79). Based on a cross-sectional analysis of 7540 patients from the National Bariatric Surgery Registry, operative weight, height, age, and type of operation explained 40% to 50% of the variance in weight loss (80).

Studies of psychosocial predictors of weight loss have been inconclusive. Several, but not all, studies have suggested that postoperative weight loss is unrelated to a history of psychopathology or the presence of specific psychiatric symptoms preoperatively (37,39,81–87). Other studies have identified a relationship between preoperative symptoms of psychopathology and reports of medical complications and dietary noncompliance postoperatively, but not weight loss (86,88). Much of the research in this area, however, has suffered from many of the methodological limitations discussed above, including small sample sizes and short (e.g., 1 year) postoperative follow-ups.

Regular intake of high-sugar foods and beverages is thought to impair postoperative weight loss. At least three studies have investigated this issue by assigning patients to VBG or GBP based on their preoperative eating habits (17,18,28). Sugeran et al. (17,18) found that “sweet eaters” (defined as consuming >300 kcal/d of sweet foods or beverages) had significantly smaller weight losses with VBG than with GBP. This may have resulted from the ease with which VBG patients can consume sweets in the absence of gastric dumping. Among GBP patients, preoperative sweet consumption was related to smaller weight losses, although the difference compared with nonsweet eaters was not statistically significant (17). In a subsequent study, increased consumption of sugar was associated with smaller weight losses among GBP patients (89).

The presence of preoperative binge eating may be related to smaller weight losses or weight regain within the first 2 postoperative years (29,83,84,90,91). At least one study has found no such evidence (92). The lack of consensus may be the result of the small number of binge eaters studied and the lack of uniformity in assessing binge episodes.

Summary

Individuals with extreme obesity who present for bariatric surgery seem to suffer from a range of untoward psychosocial experiences. Several studies suggest an increased rate of psychiatric symptoms and formal psychopathology. Mood and anxiety disorders seem to be the most common conditions, although a significant minority also appear to have BED. Surgery candidates seem to experience impaired quality of life in several areas, including physical health, body image, and relationship functioning. In all areas of research reviewed, many studies suffered from significant methodological problems that call into question the validity

of the findings. Thus, the most appropriate conclusion from this research may be that bariatric surgery candidates are at increased risk for psychosocial difficulties. If sufficiently severe, such difficulties may impact postoperative outcome, including the patient’s ability to adhere to postoperative dietary requirements. In addition, they may contribute to an increased frequency of unwanted events such as nausea, vomiting, and gastric dumping. Preoperative behavioral complications also may impair postoperative weight loss and long-term weight maintenance. To date, these issues have received only limited attention in the literature.

Postoperative Studies of Psychosocial Status, Eating Behavior, and Quality of Life

Psychosocial Status

Numerous studies have suggested that patients experience an improvement in psychosocial status postoperatively (29,39,46,66,83,84,91–97). For example, participants in the SOS study reported significant reductions in depression and anxiety in the year after surgery (91). Similarly, significant improvements in depressive symptoms have been found up to 4 years postoperatively (46). These results are encouraging; however, methodological limitations with many of the other studies, including the failure to use standardized measures of symptoms or include appropriate control or comparison groups, make it difficult to draw firm conclusions from the research.

Other studies have examined changes in formal psychiatric diagnoses. For example, of 41% of patients who had an Axis I psychiatric diagnosis preoperatively, only 22% were found to have a diagnosis, based on a clinical interview, at 3 years postoperatively (38). Personality disorder diagnoses were largely unchanged, as would be expected.

These generally positive reports are contradicted by two findings. First, a significant minority of patients has been reported to experience a negative psychological response postoperatively (85,98–100). For example, Larsen (38) reported that 19% had a poor psychiatric outcome, characterized by an increase in psychiatric symptoms, even with an acceptable weight loss. Second, several studies have suggested that improvements in psychosocial status seem to wane with time. In the SOS study, improvements in depression and anxiety observed in the first 6 postoperative months deteriorated for women, but not for men, over the following 18 months (although they remained significantly improved compared with baseline) (91). Of even greater concern, Pories et al. (20) observed a higher-than-expected rate of suicide among patients followed for 8 years postoperatively. Other studies also have reported suicides postoperatively (32,39). These reports suggest that the potential psychosocial benefits of bariatric surgery may be limited to the first few postoperative years.

Eating Behavior

Dietary Adherence. Several studies have suggested that patients struggle to adhere to the rigors of the low-calorie postoperative diet (101–104). Caloric intake often increases significantly over time (21,89,101,105,106). For example, Brodin et al. (28) found that GBP patients consumed 2604 ± 1087 kcal/d before surgery and reduced their intake to 890 ± 407 kcal/d 6 months postoperatively. Over the next 2.5 years, caloric intake increased to 1386 ± 578 kcal/d. Studies using doubly labeled water, however, have suggested that self-reported food intake may underestimate actual intake by as much as 50% (107). Thus, patients may actually be consuming many more calories than they are reporting. The increased caloric consumption above patients' postoperative caloric demands may contribute to weight regain that typically begins after the second postoperative year (21,66,84,90).

Nausea, Plugging, and Vomiting. One- to two-thirds of patients report postoperative vomiting (28,32,65,108–112). Vomiting is thought to occur most frequently during the first few postoperative months (113). Patients studied by Stunkard et al. (113) averaged no more than 3.4 vomiting episodes per week in the first postoperative month, declining to less than one per week 6 months postoperatively. Nevertheless, vomiting has been reported for several years postoperatively (32,39,62,109,114). This vomiting, whether reflexive or self-induced, does not seem to be a purging behavior (as seen in bulimia nervosa). Instead, patients may vomit in response to intolerable foods or in an effort to clear food that has become lodged in the upper digestive track. This event, referred to as plugging or frothing, is typically the result of overeating, particularly of pasta, bread, and dry meats (32,65,108). It has been reported in as many as 43% of patients as far as 15 years postoperatively (32).

Gastric Dumping. Gastric dumping, which encompasses a variety of symptoms including nausea, flushing, bloating, faintness, fatigue, and often severe diarrhea, may be the most undesirable postoperative event. Dumping can be triggered by a variety of causes. Patient reports suggest that it most typically occurs after the consumption of foods high in sugar. The unpleasant symptoms "encourage" patients (by means of aversive conditioning) to severely limit the intake of cakes, cookies, ice cream, etc. Surprisingly, this topic has received little empirical attention. Studies suggest that dumping occurs in ~50% to 70% of GBP patients (17,20). The frequency, however, is unknown. Some reports suggest that it may not occur in all patients or may occur only temporarily during the postoperative period (29).

Disordered Eating. Dietary nonadherence, nausea, plugging, vomiting, and gastric dumping all may be influenced by disordered eating. Two studies by Hsu et al. (66,84) found that, while patients did not report any objective binge episodes (defined as the consumption of an objectively large amount of food with the experience of a loss of control)

postoperatively, a significant minority reported feelings of loss of control consistent with BED. Kalarchian et al. (115) observed no binge episodes in the 4 months after surgery. However, 46% of patients reported either objective or subjective binge episodes (defined as a loss of control during an eating episode without the consumption of an objectively large amount of food) at longer follow-up (91). No studies have looked at changes in night eating postoperatively.

Quality of Life

Most (73,74,83,91,95,109,116–119), but not all (120), studies suggest that health-related quality of life improves dramatically after surgery. In the SOS study, patients reported peak improvements in health-related quality of life at 6 and 12 months postoperatively, but these improvements deteriorated slightly at 2 years postoperatively (91). At 2 years, however, improvements in quality of life were positively correlated with the amount of weight lost (91).

The majority of patients also reported improvements in marital satisfaction and sexual functioning (38,51,76,78, 121,122). One study found an increased divorce rate (78). Careful examination of the data, however, revealed that this was the result of the dissolution of very poor relationships and not the disintegration of healthy ones. Weight loss after bariatric surgery is also associated with self-reported improvements in body image (52,76,94,123). Two cross-sectional studies have documented improvements in body image with the Appearance Evaluation subscale of the Multidimensional Body-Self Relationship Questionnaire, perhaps the most widely used body image measure (75,124). However, anecdotal reports suggest that some patients report dissatisfaction with their bodies after the massive weight loss, as a result of loose, sagging skin. As with the studies of psychosocial status and eating behavior, most of these studies have investigated changes in only the first or occasionally second postoperative year. Longitudinal studies with follow-up periods beyond this period are needed to appropriately show postoperative improvements in these domains.

Future Research Directions

The research discussed above has provided a preliminary understanding of the relevant psychosocial issues of bariatric surgery patients. The burgeoning popularity of bariatric surgery will provide ample opportunity for further study of these and other issues. Perhaps the first challenge for the next generation of research will be to clearly operationalize postoperative success. Despite the impressive overall outcomes with bariatric surgery, there is no agreement on what constitutes success in terms of size or maintenance of weight loss, improvement in comorbidities, or freedom from complications. Numerous definitions, typically using percentage of excess body weight lost, have been offered (27,28,110). Others have focused on defining postoperative

failures, characterized as either a failure to lose a significant amount of weight or the occurrence of untoward outcomes, such as food intolerance and frequent vomiting and/or dumping (27,125,126). A continued lack of consensus about postoperative success will render comparisons of studies difficult, if not impossible. This may be particularly true for comparisons of patients who have undergone GBP versus banding procedures, given the different physiological effects of the procedures. Without consensus definitions, the likely results of future studies will be a fragmented literature that ultimately tells us little about postoperative outcome.

Difficulties with patient retention further complicate the literature. Most studies have been able to retain only ~50% to 75% of preoperative samples (39,73,77,83,90,127). An optimistic interpretation of this rate of attrition is that many patients are doing well and perceive no reason to return to the surgeon's office. Alternatively, many of these individuals may experience significant difficulties and feelings of shame, guilt, and embarrassment that prevent them from returning. Future studies should employ strategies such as patient incentives or attempt to locate patients through family contacts provided at the outset of the study to maximize retention rates.

The length of an appropriate postoperative follow-up is another important issue. The American Society of Bariatric Surgeons recommends a 5-year follow-up for postoperative studies (128). They further suggest that results of <2 years should be considered "preliminary," and those from 2 to 5 years should be "intermediate." Whether these goals are realistically attainable is debatable; however, they underscore the importance of longer-term follow-up.

Beyond a small collection of demographic and descriptive variables, little is known about the predictors of postoperative outcome. Intuitively, patients with uncontrolled psychopathology, such as substance abuse, schizophrenia, dissociative identity disorder, or severe depression are thought to be unlikely to have a successful outcome. In our own program, we have seen patients with a history of each of these disorders have a successful result. These patients underwent a thorough psychological evaluation preoperatively (43,45), were psychiatrically stable at the time of surgery, and received concurrent psychiatric treatment during the postoperative course. We recommend this approach for patients who present for surgery with severe psychopathology.

The relationship between less severe forms of psychopathology and postoperative outcomes, in terms of both weight loss and psychosocial status, is unknown. A significant percentage of patients present for surgery with a psychiatric history and/or are using psychiatric medications (35,38,48,49). Many of these individuals may suffer from subclinical mood or anxiety disorders that may have only a modest impact on their daily functioning and postoperative result. As discussed above, prospective studies that include

standardized assessment methods, such as the Structured Clinical Interview for DSM Disorders, will best characterize this relationship.

Given the rate of BED among bariatric surgery candidates, this disorder's relationship to postoperative outcome also warrants additional study. Anecdotal reports suggest that some binge eaters will attempt to consume large amounts of food postoperatively, even in the face of severe pain, repeated vomiting, and creation of medical complications. Persons who overeat postoperatively also may be at risk of stretching the size of their gastric pouch. Unfortunately, none of these experiences has been well documented. Beyond these rather dramatic results, there may be additional relevant differences in surgery patients with and without BED. Persons with BED may experience disparate changes in appetite and energy intake postoperatively compared with those without BED. As with studies of psychopathology, these studies should strive to include a consensus measure of disordered eating, such as the Eating Disorder Examination.

There is little denying the strength of bariatric surgery as a treatment for extreme obesity. For many patients, however, it is possible that surgical intervention is most effective when used in combination with other treatments. At present, however, there are no accepted standards of practice regarding the use of postoperative vitamin supplementation, the composition of the postoperative diet, or the potential use of pre- or postoperative nutritional counseling. Additional study of these issues will likely facilitate the development of standards of care that will ultimately improve patient outcomes.

Many of the patients who present for bariatric surgery do so with a good understanding of the psychosocial and dietary changes they will face postoperatively. Others, however, seem to have little appreciation of these issues. These patients may benefit from more intensive preoperative nutritional and psychosocial counseling. Similarly, preliminary data from our group suggest that patients who report less adherence to the postoperative diet and greater tolerance of high-starch, high-fat foods have lost 3% less weight 20 weeks postoperatively and 8% less weight 40 weeks after surgery. Additional nutritional counseling during the immediate postoperative course may promote greater adherence to the diet and, ultimately, improve weight losses. As with the potential use of preoperative nutritional counseling, this is an empirical question that should be addressed in the next generation of research.

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