

Psychological factors and weight loss in bariatric surgery

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Purpose of review

Morbid obesity is associated with a high prevalence of psychopathological conditions that might have an impact on postsurgery outcomes. This review summarizes recent data about psychological disorders in obese patients before and after bariatric surgery as well as the assessment and impact of these factors on postsurgery outcomes.

Recent findings

Psychological health and quality of life were found to improve after bariatric surgery. Weight loss could not be clearly related to any specific psychological condition prior to surgery, but the presence of more than one psychiatric condition might play a role. A multi-intervention treatment, including approaches for lifestyle changes after bariatric surgery showed positive long-term results in term of weight loss and weight loss maintenance. Recent studies focused on eating behavior changes following bariatric surgery providing important information on the topic of eating disorders after bariatric surgery.

Summary

Psychological assessment before bariatric surgery and systematic follow-up are necessary to guarantee optimal weight loss and weight loss maintenance. The field of psychological factors in bariatric surgery is still in need of controlled randomized prospective trials to better understand relation between psychological presurgery conditions and surgical outcomes. Self-monitoring and cognitive behavioral programs could prevent weight regain.

Keywords

bariatric surgery, obesity, psychological factors, weight loss

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Introduction

Psychological disorders are frequent in obese patients, particularly in morbidly obese patients before bariatric surgery. A psychological assessment is very often required before proposing such intervention.

However, do we know whether these psychological disorders predict the outcome of this surgical intervention? Does this surgery induce new binge eating disorders (BEDs)? Would not multidisciplinary approaches be necessary before and after bariatric surgery? In this review, we will try to answer these questions in comparison with current literature.

Weight loss after bariatric surgery

Bariatric surgery demonstrated significant and durable weight loss as well as improvement in obesity-related comorbidities. From an economic point of view, a systematic review of 26 randomized controlled trials and cohort studies concluded that bariatric surgery appears to be a clinically effective and cost-effective

intervention for moderately to severely obese patients [1].

However, weight outcomes depend on the type of surgical procedure. A meta-analysis of bariatric surgery weight loss outcomes as reported in 28 studies and involving 7383 patients showed a significantly greater percentage excess weight loss (%EWL) among patients with laparoscopic gastric bypass (LGB) surgery as compared to laparoscopic adjustable gastric binding (LAGB; composite estimate for %EWL 62 vs. 49%, $P < 0.001$) [2]. The meta-analysis confirmed the superiority of LGB to LAGB in %EWL found in earlier studies.

Among 70 US veterans, the average %EWL achieved at a mean follow-up of 3.3 years was 56% after the laparoscopic Roux-en-Y gastric bypass (RYGB) [3]. Forty eight patients with 4-year follow-up maintained a mean %EWL of 55%. In the same study, after RYGB, significant improvement or complete remission was noted with all comorbidities. The most flagrant of these improvements occurred with type 2 diabetic patients as evidenced by 97% of patients with either

improvement or complete remission of diabetes [3].

A prospective, controlled Swedish Obese Subjects (SOS) study involving 4047 obese individuals showed the maximum weight losses 1–2 years after bariatric surgery [4]. The maximum weight loss was 32% for gastric bypass, 25% for vertical banded gastroplasty, and 20% for gastric banding. After 10 years, the weight losses from baseline were stabilized at 25, 16, and 14%, respectively. The overall mortality in bariatric surgery patients was significantly reduced (hazard ratio of 0.76, $P=0.04$) as compared to conventional treatment group of obese, contemporaneously matched group [4].

In another study evaluating the RYGB, the mean difference of %EWL between patients who underwent RYGB and patients with gastric banding 2 years after surgery was 17.9% [5]. A more pronounced improvement of metabolic parameters was observed in patients after RYGB as compared to gastric banding. However, these findings are based on a small cohort of only 15 morbidly obese women and need to be confirmed in a prospective randomized trial.

A systematic review of 18 studies compared RYGB and restrictive surgery in 654 patients [6]. RYGB patients had higher overall weight loss, ranging from 22 to 38% compared to 13–30% reductions of body weight in patients with restrictive surgery.

Prevalence of psychological factors associated with bariatric surgery candidates

The psychological profile of bariatric surgery candidates has been studied for several years. The prevalence of psychological disorders has repeatedly been found to be higher in individuals seeking treatment for obesity than in obese individuals in the community. Kalarchian *et al.* [7] assessed 288 individuals seeking surgery independently of the preoperative screening and approval process. Approximately 66% of the participants had a lifetime history of at least one Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV axis I disorder, and 38% met diagnostic criteria at the time of preoperative evaluation. In addition, 29% met criteria for one or more DSM-IV axis II disorders. In this study, DSM-IV axis I psychopathology was correlated with BMI.

Mood disorders, anxiety, alcohol use, or personality disorders have been reported to be higher in bariatric surgery candidates than in controls [8*,9]. These findings have been recently confirmed by Abiles *et al.* [10] who examined the psychological characteristics of 50 morbidly obese bariatric surgery candidates in a prospective observational and analytical study. Regarding psychological features,

obese patients reported higher levels of depression, anxiety, stress, and lower scores of self-esteem and quality of life than normal body weight controls. Obese patients showed also higher rates of eating behavior disorders, including binge eating episodes, eating concern, and elevated weight and shape concerns. The severity of these disorders was not correlated with BMI levels. These results are in line with observations on the impaired psychological health of obese individuals or bariatric surgery candidates that were reported in the past years [11,12].

Presurgery psychological assessment

Psychological evaluation has been introduced in the traditional prebariatric surgery assessment for 20 years. The American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic and Bariatric Surgery (AAACE/TOS/ASMBS) guidelines published in 2009 still recommend the psychological assessment with a focus on special factors that could affect the bariatric surgery outcomes [13]. Psychological factors such as current substance abuse or dependence, current acute or inadequately managed mental illness, or lack of comprehension of risks, benefits, expected outcomes, alternatives and lifestyle changes required with bariatric surgery, and unwillingness to comply with post-surgical protocol, can be considered as factors to deny or defer surgery. Psychological assessments usually consist of a semi-structured interview and standardized questionnaires for depression, anxiety, and eating disorders. Other dimensions such as self-esteem, personality disorders, and quality of life can be included. But beyond diagnostic purposes, Sogg and Mori [14*] underline that the psychosocial evaluation should not be seen as a 'gatekeeper' but as an opportunity to carefully prepare bariatric surgery candidates and identify their potential vulnerability, as well as to provide support and education to optimize the outcomes. Unrealistic expectancies regarding bariatric surgery effects on the patient's life and weight loss have to be discussed to guarantee an informed decision about surgery. Bariatric surgery can be seen by patients as a magical solution to 'cure' their obesity, without understanding the behavioral changes that will be necessary. This belief would increase the risk of weight regain. A psychological assessment can be seen as an intervention preparing for the required postsurgical behavioral changes. Sogg and Mori [14*] proposed the use of the Boston Interview for Bariatric Surgery [15,16], which reviews the topics to cover very thoughtfully, and described how to intervene adequately during the interview process.

Guidelines based on the current knowledge were recently stated for a best practice on psychological evaluation in bariatric surgery [8*,9,17]. There is a general consensus that psychiatric disorders are not exclusion

criteria for bariatric surgery. Severe disorders hindering from understanding risks of surgery or from complying with postoperative requirements should be treated first [17]. Although bariatric surgery has unambiguous benefits and is considered as the treatment of choice in the management of severe obesity, a small proportion of patients fail to lose a significant amount of weight [18], possibly because of inability to adjust their eating behavior and lifestyle. Determining which specific psychological factors might influence bariatric surgery outcome has been a critical issue for the last years. Identifying clearly and addressing these factors would enable to avoid them to compromise bariatric surgery outcomes.

Impact of bariatric surgery on psychological health and quality of life

In a review on 'bariatric psychology', van Hout and van Heck [19] proposed a list of improvements in personality features, psychopathology, depressive symptoms, body image, eating behavior, social functioning, and quality of life in the first 1 or 2 years after bariatric surgery [19]. This was confirmed in recent studies. Thonney *et al.* [20] evaluated 43 women before and 1 and 2 years following gastric bypass [20]. Depression, anxiety, and eating disorder scores improved 1 year after bariatric surgery and these results were maintained at the 2-year follow-up. In another study by Sanchez Zaldivar *et al.* [21] including 108 patients receiving surgery, depression, anxiety, drive to thinness, and body dissatisfaction improved after bariatric surgery.

Several recent studies investigated the impact of bariatric surgery on health-related quality of life (HRQoL). Kolotkin *et al.* [22] evaluated prospectively the 2-year changes in HRQoL in 308 gastric bypass patients compared with two groups of severely obese individuals who did not undergo bariatric surgery: one group of 253 individuals who sought but did not undergo gastric bypass and a second group of 272 population-based obese individuals. Dramatic improvements had occurred in weight-related and physical HRQoL for gastric bypass patients at 2 years after surgery compared with two severely obese groups who had not undergone surgery.

Van Hout *et al.* [23] did the same observation among 107 obese patients assessed at baseline and 6, 12, and 24 months after vertical banded gastroplasty. HRQoL showed significant improvements over time, especially in the physical domains.

Chang *et al.* [24] observed HRQoL changes in 102 patients after RYGB during the first year of follow-up. A mixed-effect model showed that the physical, psychological, and social domains improved after bariatric surgery, with simultaneous reduction of body weight

and improvement in obesity-related comorbidities. There was a dip in scores in physical and psychological domains 3–6 months after surgery, significantly related to complications. All patients gradually improved between 6 and 12 months after surgery, reaching levels similar to those of healthy individuals.

Klingemann *et al.* [25] evaluated HRQoL before and 1 year after gastric bypass in a group of 62 women with the Nottingham Health Profile (NHP) questionnaire. A highly significant improvement in energy, pain, and physical mobility as well as emotional reactions was reported. This improvement was not influenced by the amount of weight loss, but rather by the BMI achieved at 1 year.

Improvements of psychopathology following bariatric surgery were generally found, but a significant minority of patients did not benefit psychologically from the surgery. An important study on mortality among patients who underwent bariatric surgery mentioned that elevated mood disorders before surgery can stay high following the intervention, possibly leading to some higher than expected rate of suicide in bariatric surgery patients compared to controls [26].

Impact of presurgery psychological factors on weight loss

Bariatric surgery could have a positive impact on psychological health in most cases. On the other hand, there is much less evidence regarding a specific psychological profile, which would affect weight loss after surgery. The review articles mention the inconsistency of data [27]. Among the conclusions that could be drawn, no particular psychiatric conditions before surgery could be related to weight loss after surgery (Table 1) [28–33].

Some recent studies in the past 2 years investigated this topic with various results. In 43 women followed 2 years after gastric bypass, Thonney *et al.* [20] evaluated the relationship between depression, anxiety (assessed by Beck Depression Inventory, BDI-II, and Hospital Anxiety and Depression Scale, HAD), eating disorders (assessed by Eating Disorder Inventory, EDI-2) and weight loss. Psychological factors assessed in patients before surgery did not have an impact on weight loss 2 years after surgery [20].

Gorin and Raftopoulos [28] investigated the effects of combined history of mood and eating disorders on the outcomes of bariatric surgery in 196 patients undergoing RYGB. A combined history of mood and eating disorders was associated with poorer treatment compliance than the presence of one of these disorders. Nevertheless, a similar weight loss was achieved 6 months postoperatively. In that

Table 1 Impact of psychological factors before bariatric surgery on weight loss outcomes after surgery

Reference	Number of patients	Follow-up	Association with weight loss	No association with weight loss
Thonney <i>et al.</i> [20]	43	2 years	–	Depression Anxiety
Gorin and Raftopoulos [28]	196	6 months	–	Eating disorders
Alger-Mayer <i>et al.</i> [29]	157	6 years	–	Eating disorders Depression HRQoL
Belanger <i>et al.</i> [30]	143	6 months	Personality profile	–
Rutledge <i>et al.</i> [31]	60	2 years	Number of psychiatric conditions	Depression Anxiety Eating disorders
Kinzl <i>et al.</i> [32]	140	50 months	Number of psychiatric conditions	–
Van Hout <i>et al.</i> [33]	112	2 years	–	Eating behavior Personality Psychosocial functioning Body image HRQoL

HRQoL, health-related quality of life.

study, the history of psychiatric conditions was assessed using a script interview conducted by a licensed clinical psychologist or psychiatrist.

Alger-Mayer *et al.* [29] assessed binge eating, depression, and HRQoL before and 6 years after surgery in 157 bariatric surgery patients. Presurgery binge status (assessed by Gormally Binge Eating Scale, BES), incidence of depression symptoms (BDI questionnaire), and HRQoL (SF-36 questionnaire) were not predictive of weight loss outcome in patients who were able to make lifestyle changes in preparation for surgery and who adhered to scheduled postsurgery clinic visits.

Belanger *et al.* [30] showed in 143 bariatric surgery candidates that a personality profile assessed by Minnesota Multiphasic Personality Inventory (MMPI)/Millon Clinical Multiaxial Inventory (MCMI) was predictive of weight loss. In fact, lower compulsivity and a lower tendency to deny disorder were associated with greater weight loss. The MCMI schizoid and schizotypal personality scales were correlated with poorer weight loss. However, these results should be interpreted with caution because the MMPI questionnaire used in that study is a screening instrument, and thus, no conclusions could be drawn regarding the predictive value of personality disorders.

Rutledge *et al.* [31] assessed the presence of several psychiatric disorders before bariatric surgery among 60 adult veterans and analyzed their impact on weight loss 1 and 2 years after surgery. The authors concluded that weight loss at 1 year was not associated specifically with the presence of depression, anxiety disorders, and binge eating or suicide attempt histories. However, the percentage BMI changes documented from 1 year postsurgery to 2 years postsurgery were significantly and inversely cor-

related with the number of psychiatric conditions. It should be noted that psychiatric diagnoses were coded from different sources (evaluation by a licensed psychologist, physician history and physical examination, review of active medication as of the time of surgery).

Kinzl *et al.* [32] found in 140 women following laparoscopic Swedish adjustable gastric banding that individuals with two or more psychiatric disorders lost less weight than those with one or no psychiatric disorder.

Van Hout *et al.* [33] evaluated HRQoL, personality, psychosocial functioning, body image, and eating behavior assessed by different validated questionnaires in 112 morbidly obese patients who underwent vertical banded gastroplasty. After 2 years, no predictors of EWL could be found. Furthermore, patients reported better psychological functioning, body image, physical HRQoL, and more adequate eating behavior.

Multiintervention treatment after bariatric surgery

The results of recent studies are in line with what was observed before. No strict psychopathological condition would predict weight loss, but the presence of more than one psychiatric condition prior to surgery may play a role in bariatric surgery follow-up. A lower denial of disorder and compliance with postsurgery protocol would be associated with a better outcome. In a study with an exceptional participation rate of 96% in a 7-year follow-up, Steffen *et al.* [34**] showed that a multiintervention treatment combining adjustable gastric banding with intensive follow-up could achieve and preserve weight loss and reduce comorbidity up to 7 years after surgery. The intensive follow-up included regular visits to an obesity specialist and participation in intensive program

of lifestyle changes, as administered traditionally to non-surgical obese patients. Papalazarou *et al.* [35] also found in 30 vertical banded gastroplasty women randomized in two groups that the inclusion of lifestyle intervention after surgery enabled greater weight loss and weight loss maintenance compared to a usual care group. Counseling to support necessary lifestyle changes after surgery should be included for an effective treatment of severe obesity. Lier *et al.* [36] observed the importance of psychiatric disorders, such as a higher prevalence of social phobia and avoidant personality disorder in patients who disagreed to participate in counseling groups and recommended an individual or web-based follow-up for these individuals reluctant to group treatment.

Finally, Greenberg *et al.* [8^{*}] underscore that inconsistencies in data collection and a lack of systematization in the variables observed make it difficult to draw clear conclusions between any psychosocial factor and post-surgery outcomes [8^{*}]. To reach this goal, they claim for adequately powered and controlled prospective trials to better understand relation between psychosocial factors before surgery and surgical outcomes, and randomized controlled trials to test the effectiveness of treatments to reduce the impact of psychosocial risk factors on weight loss [8^{*}].

Eating behavior after bariatric surgery

Among psychological factors improving after surgery, eating disorders have inconsistently been reported to disappear or not, consecutively to bariatric surgery. In a review on the topic, Niego *et al.* [37] underline that the various definitions of eating disorder might lead to these inconsistencies and encourage them to reach a consensus on how to define binge eating after bariatric surgery. Bariatric surgery may lead to a physical impossibility of consuming unusually large amounts of food as required by BED diagnosis criteria. However, loss of control (LOC) on eating or grazing (frequently eating relatively small amounts of food) can appear or re-appear after surgery.

In a first study attempting to characterize ‘nonnormative’ eating patterns after bariatric surgery on 129 individuals undergoing gastric banding, Colles *et al.* [38] found that uncontrolled eating and grazing were related to poorer weight loss and elevated psychological distress. Baseline BED was not associated with postsurgical weight loss, but was a risk factor for postsurgical uncontrolled eating and grazing.

In a first study using face-to-face standardized interview to describe thoroughly bariatric surgery patients’ eating behavior, de Zwaan *et al.* [39^{**}] interviewed 59 patients 2 years after RYGB surgery in order to describe

eating behavior after bariatric surgery. The prevalence of BED and bulimia nervosa before surgery was 28.8% but no binge eating episode was reported after surgery. Nevertheless, 25% of patients reported bulimic episodes like LOC on small quantities of food and 12% vomiting for weight and shape reasons. This was quite new as vomiting has always been supposed to be involuntary and related to physical consequences of surgery. Bulimic episodes were significantly more common in patients with a preoperative eating disorder and were associated with less weight loss, vomiting for weight-related reasons, and more pathological scores on the measures of eating-related and general psychopathology after surgery. This study is the first to focus on vomiting as an additional weight-control mean after surgery. New forms of eating behavior disorders may develop after bariatric surgery and need further investigation.

In line with these previous studies, White *et al.* [40] examined LOC over eating in 361 bariatric surgery patients over 24 months following surgery. Patients were assessed presurgery and then at 6, 12, and 24 months of follow-up. Prior to surgery, 61% of patients reported LOC over eating. Preoperative LOC predicted prospectively postoperative LOC, but not weight loss postsurgery. Postoperative LOC predicted a poorer weight loss following surgery and had more influence as the time post surgery increased. Patients reporting postoperative LOC had elevated depressive symptoms and eating disturbances as well as lower levels of HRQoL. According to this study, LOC before surgery would not be a contraindication for bariatric surgery, but LOC after surgery could be correlated with a poorer outcome and would need intervention during postsurgical care.

As underlined by Kruseman *et al.* [41], who assessed patients 8 years after gastric bypass, eating behavior should not only be screened before, but also periodically after surgery, as these disorders are frequent and can occur any time after operation.

In the same line, Odom *et al.* [42] studied psychological and behavioral predictors of weight loss after surgery in 203 bariatric surgery patients. Greater weight regain was associated with food urges, decreased well being, and concerns over alcohol and drug use. In this study, self-monitoring of food, drink, exercise, and weight coupled with cognitive behavioral techniques prevented patients from regaining weight. Combining bariatric surgery with traditional behavioral and cognitive weight loss program after surgery might help weight control.

This emphasizes again the importance of following bariatric surgery patients after surgery with programs focusing on lifestyle changes as for nonbariatric obese

patients, to guarantee maintenance of postsurgery outcomes in the long-term.

Conclusion

Bariatric surgery is recognized as the treatment of choice and to be a clinically effective and cost-effective intervention for moderately to severely obese patients. In obese patients looking for treatment, the prevalence of psychiatric and personality disorders is higher than that in obese individuals from the community. Thus, a presurgery psychological assessment is used to screen candidates for bariatric surgery in order to address any early factor that might jeopardize compliance after surgery and compromise weight loss. Furthermore, psychological assessment has been suggested to be used as a unique opportunity to prepare these patients to the behavior and lifestyle changes required after surgery. High psychological disorder prevalence is observed in bariatric surgery candidates, but no clear relationship could be found between presurgical psychological factors and weight loss after surgery.

Recently, several studies focused on eating behavior disorders after surgery. These studies brought new information about how eating behavior can evolve pathologically and found correlations between nonnormative eating behaviors after surgery and a poorer weight loss. Self-monitoring and cognitive behavioral techniques could prevent weight regain. Multiintervention treatments, including surgery and intensive follow-up to support lifestyle changes needed after surgery are recommended for an effective treatment of severe obesity. Clinicians should carefully evaluate postsurgery eating behavior to intervene early enough if needed. Future research should further describe presurgical and postsurgical psychological and behavioral factors and their relationship with weight loss, and evaluate interventions that might preserve good health and HRQoL outcomes after bariatric surgery.

Acknowledgement

The authors declare no conflict of interest.

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Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 198).

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