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Bariatric surgery in patients with bipolar spectrum disorders: Selection factors, post-operative visit attendance, and weight outcomes

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Abstract

Background—As many of 3% of bariatric surgery candidates are diagnosed with a bipolar spectrum disorder.

Objectives—1) To describe differences between patients with bipolar spectrum disorders who are approved and not approved for surgery by the mental health evaluator. 2) To examine surgical outcomes of patients with bipolar spectrum disorders.

Setting—Academic medical center, United States.

Methods—A retrospective record review was conducted of consecutive patients who applied for bariatric surgery between 2004 and 2009. Patients diagnosed with bipolar spectrum disorders who were approved for surgery (n=42) were compared with patients with a bipolar spectrum disorder who were not approved (n=31) and to matched control surgical patients without a bipolar spectrum diagnosis (n=29) on a variety of characteristics and surgical outcomes.

Results—Of bariatric surgery candidates diagnosed with a bipolar spectrum disorder who applied for surgery, 57% were approved by the psychologist and 48% ultimately had surgery. Patients with a bipolar spectrum disorder who were approved for surgery were less likely to have had a previous psychiatric hospitalizations than those who were not approved for surgery. Bariatric surgery patients diagnosed with a bipolar spectrum disorder were less likely to attend follow-up care appointments 2 or more years post-surgery compared to matched patients without bipolar disorder. Among patients with available data, those with a bipolar spectrum disorder and matched patients had similar weight loss at 12 months (n=21 for bipolar, n=24 for matched controls) and at 2 or more years (mean=51 months; n=11 for bipolar, n=20 for matched controls).

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Conclusions—Patients diagnosed with a bipolar spectrum disorder have a high rate of delay/denial for bariatric surgery based on the psychosocial evaluation and are less likely to attend medical follow-up care 2 or more years post-surgery. Carefully screened patients with bipolar disorder who engage in long-term follow-up care may benefit from bariatric surgery.

Keywords

Bipolar disorder; bariatric surgery; adherence; weight loss

Introduction

Approximately 1.5–3.4% of bariatric surgery candidates have a diagnosis on the bipolar spectrum (e.g., Bipolar I, II, cyclothymia) ^(1–4), and patients with bipolar disorder are significantly more likely to be obese when compared to the general population ⁽⁵⁾. Bipolar spectrum disorders have a lifelong trajectory and are cyclical in nature. Depressive episodes that are common for most individuals with bipolar disorder are well-known to be associated with weight gain ⁽⁶⁾, possibly due to increased emotionally motivated eating, decreased self-care behaviors and decreased motivation for behavior change ⁽⁷⁾. Another contributing factor to obesity in patients with bipolar disorder is the use of certain psychotropic medications, as many of these medications have been linked to weight gain⁽⁸⁾. Furthermore, depressive or manic episodes may contribute to behaviors that increase the risk for post-surgical complications⁽⁵⁾.

Although bipolar spectrum disorders are not considered an absolute contraindication for bariatric surgery, little is known about the specific outcomes for patients with a bipolar spectrum disorder. Current guidelines for bariatric surgery recommend that patients with known or suspected psychiatric illness should undergo a psychosocial evaluation ⁽⁹⁾, and most bariatric surgery programs and third-party payers in the United States require this evaluation. A formal psychosocial evaluation by a mental health provider with expertise in bariatric surgery likely is particularly important for patients with bipolar spectrum disorders for a variety of reasons including the potential severity of symptomatology, impulsivity, knowledge about bariatric surgery and potential psychotropic medication absorption issues, and potential disability associated with this disorder. Further, mental health professionals seem to vary widely on their recommendations regarding bariatric surgery for patients with a bipolar spectrum disorder. A 2005 study found that active bipolar symptoms were considered a definite contraindication to surgery by 62% of bariatric center representatives and a possible contraindication by 32%; controlled symptoms of bipolar disorder were reported to be a definite contraindication by 3% and a possible contraindication by 82% ⁽¹⁰⁾. There are not any well-defined guidelines to identify patients diagnosed with a bipolar spectrum disorder who are and are not appropriate for bariatric surgery. Indeed, such guidelines may not be practical, given the complexity of individual patients' situations. However, an underlying goal in evaluating all patients for bariatric surgery is to assess if they will be able to manage post-operative challenges ⁽¹¹⁾. Little empirical data is available on the results of the psychological evaluation for patients with bipolar spectrum disorders. There seems to be even less information about what characteristics distinguish patients with

a bipolar spectrum disorder who are approved for surgery by mental health providers from those who are not approved.

Among individuals with a bipolar spectrum disorder who are approved for and obtain bariatric surgery, surgical outcome data is limited. We are aware of only two studies that have examined the surgical outcomes of bariatric surgery patients with a bipolar spectrum disorder separately from other mental health disorders. Both studies found weight losses at 12 months were similar for patients with and without bipolar spectrum disorders^(1, 2). Further, Steinmann et al., reported similar follow up attendance for patients with bipolar disorder at 12 months compared to those without bipolar disorder⁽²⁾. A few other studies have examined surgical outcomes among bariatric patients with bipolar spectrum disorders, but these studies have combined bipolar spectrum disorders with other mental health diagnoses (e.g., schizophrenia)^(12,13) and have also included relatively short follow-up periods (12 months)⁽¹³⁾ limiting their value for revealing any impact of bipolar disorder symptoms on weight loss outcome in the longer-term.

In the current study, we had two primary objectives: 1) To describe the outcomes of the psychosocial evaluation for bariatric surgery patients diagnosed with a bipolar spectrum disorder, and differences between patients who were approved and not approved for surgery by mental health evaluators; 2) To compare individuals with a bipolar spectrum disorder who had bariatric surgery with matched patients without a bipolar spectrum disorder on post-surgical weight change and follow-up care attendance, including longer-term weight outcomes. This research was conducted in a clinically derived sample of patients at a high volume, academic bariatric surgery center.

Methods

Participants

This is a retrospective database study of patients who applied for bariatric surgery at the (insert center name here) between January 2004 and December 2009, with surgeries occurring between November 2004 and June 2012. We included in the current study all patients seen within this time frame who were determined to have a bipolar spectrum disorder or related diagnoses characterized by presence of suspected manic/hypomanic episodes, which included patients diagnosed with Bipolar Disorder I or II, most recent episode depressed; Bipolar Disorder I or II, most recent episode manic; Bipolar Disorder I or II, most recent episode mixed; Bipolar Disorder, Not Otherwise Specified; and Cyclothymia. Matched control patients were selected from the database of all surgical patients without a bipolar spectrum disorder diagnoses. One-to-one matching was used, with criteria including gender, surgical procedure, age (within 3 years), date of surgery (within 3 years), Body Mass Index (BMI; within 3 kg/m²), and OS-MRS scale score (a clinical scoring system to stratify mortality risk for patients undergoing bariatric surgery)⁽¹⁴⁾. Patients with a bipolar spectrum disorder for whom an appropriate match could not be identified were removed from the analyses comparing surgical patients and matched patients (n=6). The study protocol was approved by the (insert center name here) Institutional Review Board and complies with ethical standards with regards to research and the use of human participants.

Procedures

All patients underwent a thorough preoperative assessment, including nutritional, psychological, and medical evaluations. As part of the psychosocial assessment, patients complete a battery of psychosocial questionnaires as well as a semi-structured diagnostic clinical interview. Interviews were conducted by a licensed clinical psychologist with expertise in bariatric surgery or a pre-doctoral psychology intern supervised by a licensed psychologist.

Results of the psychosocial evaluation had three outcomes: approved, denied, or delayed for surgery. As part of the process of determining appropriateness for surgery, if a patient was being treated by any mental health provider, their provider(s) was contacted by the evaluating psychologist to obtain collateral information about the patient's care, psychiatric history, and current functioning. In addition, any patient who had their surgery delayed were provided with a verbal and written treatment plan and their adherence level with this treatment plan determined if they were ultimately approved or denied (see Friedman et al. ⁽¹⁵⁾ for further details about this process).

Routinely, patients were recommended to attend surgical follow-up appointments after surgery at 3 weeks, 3 months, 6 months, 1 year, and yearly thereafter. Behavioral groups providing cognitive behavioral skills were offered to coincide with each of the follow-up appointment times for surgery within the first year for most patients; however, due to programmatic changes, for two patients these groups were discontinued prior to the end of their first year after surgery.

Measures

Psychosocial measures that are well-validated and reliable were administered during the psychological evaluation and examined here to determine differences between patients at the time of the psychological evaluation. Measure including The Symptom Checklist-90 (SCL-90; a measure of psychiatric symptom severity; see Table 1 for subscales ⁽¹⁶⁾), the Beck Depression Inventory –first edition (BDI-I; a measure of depressive symptom severity)⁽¹⁷⁾, The Toronto Alexithymia Scale (TAS; a measure of ability to identify and express emotions)⁽¹⁸⁾, and The Binge Eating Scale (BES; a measure of emotional overeating)⁽¹⁹⁾.

Information on surgery (procedure, date), surgical outcomes (weight, appointment attendance), and hospital readmissions with diagnoses related to surgery (not psychiatric) were obtained from electronic medical records. Weight and height measured at medical appointments were used to calculate weight-related outcomes of interest. The pre-surgical weight was based on weight taken at their last pre-operative appointment, that is, their appointment closest to their surgery day and not the date of their pre-surgical psychological evaluation. Other psychological characteristics and history were obtained from patients' charts as documented during the psychosocial evaluation.

Data abstraction occurred in 2015–2016, thus, a minimum possible follow-up period of 3 years and maximum of 10 years was possible. The observed follow-up period varied from no follow-up to 97 months post-surgery, with a mean length of follow-up of 32 months (2.66

years). In order to examine longer-term weight outcomes, we created a variable that captured patients' weight at their last recorded follow-up appointment if it occurred 24 months or more post-surgery. Among those individuals who attended a follow-up appointment 24 months post-surgery, the mean follow-up appointment occurred 51.2 months (4.27 years) post-surgery. Given that some patients were offered fewer post-operative behavioral groups than others due to the aforementioned programmatic changes, percentage attendance of behavioral groups was calculated.

Statistical analyses

Means and standard deviations were calculated for continuous variables and frequencies and percentages for discrete variables. For Aim 1, we compared patients with a bipolar spectrum disorder who were approved ($n = 42$) to those not approved ($n = 31$) for surgery. For Aim 2, we compared patients with a bipolar spectrum disorder who had surgery and for whom there was an available match ($n=29$) with matched control patients ($n=29$). Comparisons were conducted using t-tests for continuous variables and chi-squared or Fisher's tests for discrete variables. Because missing weight data indicated lack of clinical follow-up, missing data were examined in analyses that are presented for follow-up care attendance. For weight outcome analyses, we used listwise deletion on patients without follow-up data at the time point of interest.

Results

Psychosocial evaluations were conducted on 3,263 patients during the timeframe of interest, of whom 73 received a diagnosis of a bipolar spectrum disorder (2.2%). Among those with a bipolar spectrum disorder, 35.6% ($n=26$) were initially approved, 45.2% ($n=33$) were initially delayed, and 19.2% ($n=14$) were initially denied by the psychosocial evaluator (see Figure 1). Among candidates who were initially delayed for surgery, 48.5% ($n=16$) were subsequently approved for surgery after being adherent with their treatment plan. Of all 73 candidates with bipolar spectrum disorders, 47.9% ($n=35$) ultimately had surgery at the clinic and 52.1% ($n=38$) did not have surgery at this clinic. Of those that were approved for surgery, 14.3% ($n=7$) did not have surgery with our program for unknown reasons.

Objective 1: Comparing patients with bipolar spectrum disorders approved and not approved for bariatric surgery

Race and past psychiatric hospitalization were the only characteristic that differentiated patients diagnosed with a bipolar spectrum disorder who were approved and those who were not approved (see Table 1). Specifically, Caucasian patients and patients without a history of past psychiatric hospitalization were more likely to be approved.

We also examined candidates' individual mental health providers' opinion about the patient having surgery. Among those candidates who had a counselor/psychotherapist ($n=14$ for approved patients who had surgery, $n=7$ for patients never approved for surgery), 100% of the therapists supported their patient being approved for bariatric surgery. Psychiatrists were less likely to support surgery. Among approved candidates who went on to have surgery, 91.4% (32 of 35 total patients) had a psychiatrist. Among those with a psychiatrist, 87.5%

(n=28) of the psychiatrist supported surgery for their patient at the initial contact, 3.5% (n=1) were not supportive, and 10.7% (n=3) had no opinion. Among patients with bipolar spectrum disorders who were never approved for surgery, 92.1% (35 of 38 total patients) reported having a psychiatrist. Among those with a psychiatrist, 81.6% (n=31) were contacted, 7.9% (n=3) could not be contacted, and 1 was not contacted due to denial of surgery prior to attempt to contact. Of the 31 psychiatrists who were contacted, 45.1% (n=14) supported surgery for their patient, 22.5% (n=7) did not support surgery, and 32.3% (n=10) had no opinion.

Objective 2: Comparing bariatric surgery patients with bipolar spectrum disorders with matched control bariatric patients

Among patients diagnosed with a bipolar spectrum disorder who had bariatric surgery and for whom a matched control was available (n=29), the majority had Roux-en-y gastric bypass (n=26 in both bipolar group and matched group, 89.7%). Three patients (10.3%) in each group had a gastric band. As anticipated based on matching procedures, no differences were observed on demographic characteristics between the groups (see Table 2).

Several differences were found on psychosocial and clinical characteristics of patients with bipolar spectrum disorders who had bariatric surgery and matched controls at the time of the psychology evaluation (pre-surgery; Table 2). Patients with a bipolar spectrum disorder were more likely to be in treatment with a mental health professional, to be prescribed antipsychotic medication, to be psychiatrically disabled, to have received an anxiety disorder diagnosis, report a history of suicide attempts, and report a history of psychiatric hospitalizations. They also reported more severe depressive symptoms, greater interpersonal sensitivity, paranoid cognitions, phobic cognitions/behaviors, anxiety, and psychotic symptoms. Consistent with the greater frequency of delays from the psychological evaluation, wait time to surgery differed significantly between groups. For surgical patients, after two outliers were removed in the bipolar group, the average wait was 318.2 days (SD=323.3) and for controls it was 129.4 days (SD=75.5), $t(30.6)=2.99$, $p=.01$. Of note, some of these long wait times may have been associated with insurance related requirements.

Patients with a bipolar spectrum disorder attended follow-up care (medical and behavioral) at similar frequency as those without a bipolar spectrum disorder during the first year post-surgery, but were less likely to attend medical follow-up appointments 2 or more years post-surgery (Table 3). In a post-hoc analysis, we found that being in treatment with a mental health counselor (outside of the bariatric program) at the time of the initial evaluation was not associated with post-operative follow-up care attendance 2 or more years later, $\chi(1)=0.24$, $p=0.63$. The number of cognitive behavioral groups attended in the first year post-operative was also not associated with clinical visit attendance 2 or more years later, $p=.34$. Note that we looked at cognitive behavioral groups, not support groups. Although our center does offer monthly support groups, we did not examine the attendance at these sessions, which tend to be less structured and larger in nature.

Regarding weight changes, at six months post-surgery patients diagnosed with a bipolar spectrum disorder had a significantly smaller percent excess body weight loss (see Table 3).

However, at 12 months and 2 or more years after surgery (mean of 51.2 months), no differences in weight losses were observed.

Given the small number of surgery-related medical hospital re-admissions in the sample, we did not do formal analyses on this data. Descriptively, however, among the 35 patients with a bipolar spectrum disorder who had surgery, hospital re-admissions linked to bariatric surgery occurred in 2 patients within 30 days of surgery (5.7%), both for nausea/vomiting and dehydration. None of the 29 matched control patients were re-admitted within 30 days. For comparison, at the time of this study (2004–2009), 3.4% of all first-time surgical patients at this clinic had 30 day readmissions. At 1 year post-surgery, hospital readmissions linked to surgery were present in 6 of the 35 patients with a bipolar spectrum disorder (17.1%) and in 1 of the 29 matched controls (3.4%).

Discussion

This study had two main objectives: 1) to compare patients diagnosed with a bipolar spectrum disorder who are approved for bariatric surgery based on the psychosocial evaluation to those patients with a bipolar spectrum disorder who are not approved for surgery and 2) to compare bariatric surgery outcomes (follow-up care attendance and weight loss) for patients diagnosed with a bipolar spectrum disorder and matched control patients. We found that overall, patients diagnosed with bipolar spectrum disorders have a relatively low rate for ultimately being approved for bariatric surgery (57%), and patients with a bipolar spectrum disorder were less likely to be approved if they had a past psychiatric hospitalization. Among patients who ultimately had bariatric surgery, those with bipolar spectrum disorders were less likely to follow up with their surgical team two or more years after surgery. However, for patients who attended medical follow-up care two or more years post-surgery, weight loss outcomes were similar between those with and without bipolar spectrum disorders at an average of 4 years post-surgery.

Patients diagnosed with a bipolar spectrum disorder in this study have a much higher rate of being delayed for surgery based on the psychosocial evaluation when compared to previous data obtained at this clinic (45% vs. 8%)⁽¹⁵⁾. We also found that 19% of patients with bipolar spectrum disorders were denied at the time of their initial psychosocial evaluation, which is notably higher than rates of 3–4% reported in the literature for the overall bariatric patient population^(20,21). This suggests that patients with bipolar spectrum disorders seem to be at higher risk of not obtaining bariatric surgery based on psychosocial variables.

Notably, all treating therapists and most psychiatrists who were contacted as part of the evaluation process were supportive of their patients having bariatric surgery. Indeed, among patients who did not gain approval at our clinic, nearly half of the psychiatrists supported patients getting surgery. This suggests the importance of an independent evaluator with expertise in bariatric surgery in order to determine appropriateness for bariatric surgery from a psychosocial standpoint. Having a treating mental health provider conduct these evaluations likely introduces a level of bias and conflicting roles and thus may not provide an objective assessment.

The only factors that differentiated approved and not approved patients with bipolar spectrum disorders were psychiatric hospitalization history and race. Hospitalization history may be proxy for the level of severity of the disorder. That is, patients typically are only psychiatrically hospitalized for uncontrolled psychopathology/self-harm concerns suggesting that those with a history of hospitalization may have more severe or unstable psychopathology. We are aware of one past study comparing patients with bipolar symptoms who had and did not have surgery. In that study, Grothe et al. ⁽⁴⁾ found that patients who did not have surgery had greater anxiety, emotional and physical neglect, less distress tolerance, and less confidence in controlling eating.

While race was statistically significant in our sample, because of the small number of African American patients who were diagnosed with bipolar spectrum disorders ($n = 4$) these results need to be interpreted with extreme caution. These results suggest the need for additional research in this area. If differences are found in larger samples, it will be important to assess the potential reasons for underlying race differences.

Overall, weight losses within the first 12 months post-surgery were similar for patients with and without bipolar spectrum disorders, which is consistent with a previous studies examining patients diagnosed with a bipolar spectrum disorder ⁽²⁾. Other studies have shown less weight loss after bariatric surgery with psychiatric comorbidities that have included bipolar disorder, among other disorders ⁽¹³⁾. Unlike previous studies, we also examined weight change occurring greater than 12 months after surgery, and found no differences in weight between patients with bipolar spectrum disorders and matched control patients who attended medical follow-up care at 24 months or longer (average of 52 months) after surgery. However, these findings must be interpreted with caution given that patients with bipolar spectrum disorders were less likely to attend follow-up appointments at these later times, and thus less likely to have an available weight to analyze. It is possible that patients with missing data had gained more weight, and that if all data was available weight differences between patients diagnosed with a bipolar spectrum disorder and matched controls would be present.

Notably, patients with a bipolar spectrum disorder who had bariatric surgery at our center generally had significant mental health histories. For example, 29% of them were psychiatrically disabled, 29% had a history of suicide attempts, and 40% had a past psychiatric hospitalization. Despite this history, the overall weight loss for these individuals was similar to those without bipolar spectrum disorders. Although weight loss is not the only outcome of importance, this data suggests that bariatric surgery can be considered in patients with stable bipolar spectrum disorders.

The fact that follow-up attendance at 24 months and later was lower for patients with a bipolar diagnosis could suggest that these individuals are less likely to be adherent with treatment recommendations in the longer-term. In post-hoc analyses, we examined if follow-up care attendance was associated with being in treatment with a mental health provider outside of the bariatric program and found that it was not. It is unclear why these patients did not follow up as regularly, though it may be related to the nature of their mental illness. While research suggests that the psychiatric course for patients with stable bipolar spectrum

disorders who have bariatric surgery is similar to those patients with bipolar spectrum disorders who did not have surgery ⁽²²⁾, they nonetheless may experience psychiatric symptoms that interfere with follow-up care.

Although the sample size was too limited to draw conclusions on relatively uncommon event of surgery-related re-hospitalization, we did observe an apparent greater likelihood of re-admittance among surgical patients with bipolar spectrum disorders compared to our matched controls and the program at large, especially when considering the full year after surgery. These admittances were related to nausea and vomiting primarily, and thus may reflect issues related to adherence to behavioral/nutritional recommendations. This would be consistent with what Sarwer ⁽²⁶³⁾ postulated regarding an inability to control eating after surgery potentially being associated with gastrointestinal events/complications, which in extreme cases may lead to readmissions. Although further research is needed, it may be that a more intensive follow up program for patients with a bipolar spectrum disorder may ultimately improve patient outcomes and reduce costs.

This study has several limitations. Although larger than previous studies, our study may have been underpowered to detect some clinically meaningful effects. Conclusions about longer-term weight loss are limited due to a high proportion of patients, especially patients with bipolar spectrum disorders, who did not have available data at 24 months or longer. Rehospitalizations only capture those within the healthcare system. Additionally, we were unable to find matched controls for all of our patients with diagnosed with a bipolar spectrum disorder. Our study was also limited in that no patients had gastric sleeve procedures. The sleeve gastrectomy was not covered by insurance during most of the study period and thus was not a realistic option for this study sample.

In conclusion, these data suggest that overall, patients diagnosed with a bipolar spectrum disorder have a relatively low rate for ultimately being approved for bariatric surgery (57%). Those patients with stable bipolar spectrum disorders who have been approved for surgery by mental health professionals with expertise in bariatric surgery are less likely to attend follow-up two or more years post-surgery, and special efforts may be needed to retain these patients for longer-term follow up. Among patients with a bipolar spectrum disorder who did attend medical follow-up care two or more years post-surgery, longer term weight loss was statistically similar to matched controls. However, lower attendance of patients with bipolar spectrum disorders at follow-up visits and relatively small sample size limits our ability to draw conclusions about weight loss and suggest the need for further study.

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Figure 1. Initial and intermediate disposition of patients based on pre-surgical psychosocial evaluation and final surgical status.

Table 1

Characteristics of patients with bipolar disorder at initial psychosocial evaluation who were approved and not approved for surgery.

	Approved for surgery (N=42)	Not approved for surgery (n=31)	p-value ^a
Sex, N(%)			0.50 ^b
Male	7 (16.7)	3 (9.7)	
Female	35(83.3)	28 (90.3)	
Age at surgery, mean (SD)	46.2 (9.2)	42.7 (13.4)	0.20
Race, N(%)			0.03 ^b
African American	0 (0)	4 (12.9)	
White	41 (97.6)	27 (87.1)	
Hispanic	1 (2.4)	0 (0)	
Pre-surgical BMI, mean (SD) ^c	48.3 (8.1)	48.7 (10.5)	0.86
Pre-surgical Weight (kg) ^c	134.1 (22.6)	133.0 (34.0)	0.87
Marital status, N(%)			0.55
Single	6 (14.3)	7 (22.6)	
Married/partnered	22 (52.4)	13 (41.9)	
Divorced/separated/widowed	14 (33.3)	11 (35.5)	
Education, N(%)			0.26
High School/partial college	19 (45.2)	19 (61.3)	
Bachelor's degree	13 (31.0)	9 (29.0)	
Graduate or professional school	10 (23.8)	3 (9.7)	
Treated by psychiatrist, N(%)	37 (88.1)	24 (77.4)	0.22
Treated by counselor/therapist, N(%)	16 (38.1)	7 (22.6)	0.16
Psychiatrically disabled, N(%)	12 (28.6)	14 (45.2)	0.14
Psychotic disorder, N(%)	0 (0)	2 (6.5)	0.09
Eating disorder, N(%)	19 (45.2)	18 (58.1)	0.28
Anxiety disorder, N(%)	17 (40.5)	11 (35.5)	0.66
Prescribed mood stabilizer, N(%)	26 (61.9)	16 (51.6)	0.38
Prescribed antipsychotic medication, N(%)	17 (40.5)	18 (58.1)	0.14
History of suicide attempt, N(%)	11 (26.2)	14 (45.2)	0.09
History of psychiatric hospitalization, N(%)	17 (40.5)	22 (71.0)	0.01
History of sexual trauma, N(%)	4 (9.5)	2 (6.5)	0.64
History of physical trauma, N(%)	10 (23.8)	13 (41.9)	0.10
BDI, mean (SD)	17.2 (9.1)	17.5 (8.7)	0.90
BES, mean (SD)	27.5 (12.1)	29.7 (14.2)	0.48
Alexithymia, mean (SD)	45.9 (15.0)	48.3 (2.4)	0.48
SCL Interpersonal sensitivity, mean (SD) ^d	62.3 (11.0)	65.9 (10.2)	0.17

	Approved for surgery (N=42)	Not approved for surgery (n=31)	p-value ^a
SCL Obsessive compulsive, mean (SD) ^e	60.3 (12.0)	62.9 (9.8)	0.32
SCL Paranoid, mean (SD) ^e	55.7 (11.9)	58.6 (9.9)	0.30
SCL Phobic, mean (SD) ^e	56.1 (9.9)	58.8 (9.3)	0.25
SCL Depression, mean (SD) ^e	62.4 (9.8)	64.5 (8.2)	0.36
SCL Anxiety, mean (SD) ^e	58.4 (11.7)	57.8 (12.0)	0.83
SCL Hostility, mean (SD) ^e	56.1 (11.2)	53.6 (10.7)	0.36
SCL Psychotic, mean (SD) ^e	60.0 (11.7)	62.5 (10.5)	0.35
SCL Somatization, mean (SD) ^e	62.8 (9.9)	65.5 (8.6)	0.27

Note.

^a p-value is for chi-square test for discrete variables and t-tests for continuous variables, unless otherwise indicated.

^b values are for Fishers exact test.

^c Sample size approved n=41, not approved n=30.

^d Sample size approved n=38, not approved n=31.

^e Sample size: approved n=38, not approved n=31. BMI= Body Mass Index. BDI= Beck Depression Inventory-II. BES= Binge Eating Scale. SCL=Symptom checklist.

Table 2

Baseline demographic characteristics of bariatric surgery patients with and without bipolar disorder.

	Patients with bipolar disorder (n=29)	Patients without bipolar disorder (n=29)	p-value
Sex, N(%)			1.00 ^b
Male	4 (13.8)	4 (13.8)	
Female	25 (86.2)	25 (86.2)	
Age, mean (SD)	46.7 (9.6)	45.3 (10.1)	0.58
Race, N(%)			0.36 ^b
African American	0 (0)	1 (3)	
White	29 (100)	27 (93.1)	
Hispanic	0 (0)	1 (3)	
BMI, mean (SD)	47.7 (7.7)	46.8 (7.3)	0.68
Weight (kg), mean (SD)	133.8 (20.5)	129.9 (24.0)	0.51
Marital status, N(%)			0.93
Single	6 (20.7)	7 (24.1)	
Married/partnered	16 (55.2)	16 (55.2)	
Divorced/separated/widowed	7 (24.1)	6 (20.7)	
Education, N(%)			0.43
No bachelor's degree	13 (44.8)	15 (51.7)	
Bachelor's degree	8 (27.6)	10 (34.5)	
Graduate or professional school	8 (27.6.1)	4 (13.8)	
Treated by psychiatrist, N(%)	24 (82.8)	3 (10.3)	<0.0001
Treated by counselor/therapist, N(%)	9 (31.0)	1 (3.5)	0.005
Psychiatrically disabled, N(%)	7 (24.1)	1 (3.5)	0.02
Eating disorder, N(%)	12 (41.4)	7 (24.4)	0.16
Anxiety disorder, N(%)	10 (34.5)	2 (6.9)	0.01
Prescribed antipsychotic medication, N(%)	12 (42.4)	0 (0)	0.0001
History of suicide attempt, N(%)Prescribed antipsychotic medication	7 (24.1)	0 (0)	0.005
History of psychiatric hospitalization, N(%)	10 (34.5)	4 (13.8)	0.07
History of sexual trauma, N(%)	2 (6.9)	4 (13.8)	0.39
History of physical trauma, N(%)	9 (31.0)	4 (13.8)	0.12
BDI, mean (SD)	16.0 (8.9)	9.6 (7.0)	0.002
BES, mean (SD)	27.6 (12.0)	24.7 (12.3)	0.37
Alexithymia, mean (SD)	43.8 (12.1)	39.8 (9.3)	0.20
SCL Interpersonal sensitivity, mean (SD)	63.0 (11.1)	52.8 (13.8)	0.003
SCL Obsessive compulsive, mean (SD)	58.8 (12.1)	55.9 (9.7)	0.32
SCL Paranoid, mean (SD)	55.6 (12.2)	49.9 (8.7)	0.046
SCL Phobic, mean (SD)	55.6 (9.5)	50.1 (9.2)	0.03

	Patients with bipolar disorder (n=29)	Patients without bipolar disorder (n=29)	p-value
SCL Depression, mean (SD)	62.8 (10.6)	57.3 (8.3)	0.04
SCL Anxiety, mean (SD)	58.4 (12.3)	48.0 (9.7)	0.0008
SCL Hostility, mean (SD)	55.5 (11.3)	51.1 (9.2)	0.11
SCL Psychotic, mean (SD)	59.1 (11.7)	50.7 (9.6)	0.004
SCL Somatization, mean (SD)	61.1 (11.2)	54.8 (14.3)	0.07
Received mental health recommendation at pre-surgical psychology evaluation, N(%)	11 (37.9)	3 (10.7)	0.02
Received delay at initial evaluation, N(%)	7 (24)	12 (41)	0.19

Note.

^a p-value is for chi-square test for discrete variables and t-tests for continuous variables, unless otherwise indicated.

^b Values are for Fishers exact test. BMI= Body Mass Index. BDI= Beck Depression Inventory-II. BES= Binge Eating Scale. SCL=Symptom checklist.

Table 3

Surgical outcomes of patients with and without bipolar disorder.

	Patients with bipolar disorder (n=29)	Patients without bipolar disorder (n=29)	p-value
Percent cognitive behavioral groups attended	78.4 (23.8)	78.1 (25.3)	0.96
Attended medical follow-up at 12 months, %	21 (72.4)	24 (82.8)	0.34
Attended any medical follow-up 24 months or later, %	11 (37.9)	20 (69.0)	0.02
6 month weight outcomes ^a			
Change in BMI	12.3 (4.4)	13.0 (4.2)	0.60
% EWL	53.9 (17.8)	64.8 (16.7)	0.05
% total body wt loss	24.9 (7.8)	28.2 (6.8)	0.17
12 month weight outcomes ^b			
Change in BMI	14.9 (6.5)	15.5 (6.4)	0.74
% EWL	69.5 (25.3)	75.8 (25.0)	0.41
% total body wt loss	31.5 (11.9)	33.3 (11.3)	0.61
Long-term weight outcome (24 months or greater) ^c			
Change in BMI	16.1 (8.6)	14.0 (7.5)	0.50
% EWL	70.3 (22.0)	68.4 (31.4)	0.86
% total body wt loss	32.7 (13.1)	30.2 (14.2)	0.63

Notes.

^aSample size at 6 months: bipolar group, n=18, nonbipolar n=23.^bSample size at 12 months: bipolar group n=21, non-bipolar n=24.^cSample size at 24 months or greater: bipolar group=11, non-bipolar = 20. EWL= Excess weight loss. BMI= Body Mass Index.