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ORIGINAL CONTRIBUTIONS

Adherence to Psychiatric Follow-up Predicts 1-Year BMI Loss in Gastric Bypass Surgery Patients

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Abstract
Objective The objective of this study was to investigate the effects of adherence to postoperative recommended psychiatric follow-up on weight loss in morbid obesity patients with psychiatric disorders 1 year after gastric bypass.
Methods Three hundred eighteen morbidly obese patients were retrospectively reviewed. They were divided into four groups according to preoperative psychiatric evaluations and adherence to psychiatric follow-up 1 year after their bypass surgery. The first group included patients who did not meet the referral criteria (NMRC). The second group consisted of patients who did not meet the psychiatric diagnostic criteria (NMDC). The third group was patients who met criteria for a psychiatric disorder and were nonadherent (NA) to psychiatric follow-up. The fourth group consisted of patients who met criteria for a psychiatric disorder and were adherent (A) to psychiatric follow-up.
Results The A group exhibited higher % change in BMI than the NA and NMRC groups at 1 year after bypass surgery. Regression analyses to examine the effects of the grouping variable on % change in BMI were performed by controlling the effects of age, gender, educational level, and preoperative BMI. The regression coefficient for the grouping variable was 0.175 (p=.003) at the 6-month and 0.133 (p=.027) at the 1-year % change in BMI.
Conclusion Our preliminary data suggest that adherence to postoperative psychiatric follow-up is associated with greater postoperative weight loss. However, evidence from studies with a longer follow-up is required to justify this therapeutic approach.

Keywords Adherence · Psychiatric disorders · Psychiatric follow-up · Gastric bypass surgery · Excess weight loss

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Introduction

Psychiatric disorders are very common among bariatric patients, with rates reported from 20 to 60 % in the literature [1–5] and a lifetime risk as high as 70 % [6]. Recently, Lin et al. from Taiwan [7] reported that in their series, 54.1 % of 455 bariatric patients had at least one psychiatric disorder. However, research has yielded inconsistent findings [8, 9] regarding the potential association of psychiatric disorders and postoperative outcomes. Psychiatric disorders have been related to poorer weight loss in some studies [10–14], while others have reported conflicting results [8, 15–22]. The explanation for these discrepancies in the literature may be

multifactorial, including differences in the sampling of patients, the selection of mental health criteria, differences in surgical procedures performed, different criteria used for the evaluation of weight loss, duration of follow-up, and patients' adherence to their psychiatric treatment recommendations.

Poor adherence has often been associated with poor outcome [23]. Rates of missed appointments have been reported to be between 20 and 50 % in various mental health settings [24]. Frequent breaking of appointments with a physician appeared to be associated with poor medication adherence and poor health outcomes [25, 26]. There are few studies that have investigated the effect of adherence to psychiatric follow-up appointments on postsurgical weight loss. The objective of this study was to investigate the effects of adherence to postoperative recommended psychiatric follow-up appointments on weight loss in morbid obesity patients with psychiatric disorders 1 year after gastric bypass.

Methods

Subjects

This a retrospective chart review of 373 morbidly obese patients who underwent bypass surgery at the obesity treatment center in Taiwan between January 2008 and December 2011. Of the initial sample, 40 had major complication after surgery (e.g., small bowel obstruction, complicated marginal ulcer), 3 had incomplete Taiwanese Depression Questionnaire (TDQ) or Chinese Health Questionnaire (CHQ) data, and 12 refusing a psychiatric interview. Thus, the final sample included 318 patients.

All patients were screened by a multidisciplinary committee in our hospital to determine whether they were eligible for bariatric surgery. The patients underwent a thorough preoperative physical evaluation and completed two questionnaires: the TDQ and CHQ [7]. The TDQ consists of 18 questions scored between 0 and 3 points and is designed to be used for screening clinical depressive disorder [27]. The cutoff point in the community population was 18/19 points. The CHQ [28] is a 12-question, 2-reverse questions, 0-1-point questionnaire used for the screening of "minor psychiatric disorders" such as anxiety disorder. The cutoff point in the community survey screening for minor mental disorders was 4/5 points.

To avoid false-negative results, we lowered the cutoff points for the CHQ and TDQ in our clinical practice [7]. Those subjects with CHQ<3 and TDQ<13 were regarded as having no psychiatric disorders. If either of the two scores was above the cutoff point (i.e., CHQ≥3, or TDQ≥13, or both) or there was a history of psychiatric disorder, the subject would be referred to the psychiatrist for further evaluation. Psychiatric diagnosis was made based on the psychiatrist's diagnostic interview, using the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). The decision on psychiatric intervention (pharmacotherapy and/or psychotherapy) and frequency of follow-up appointments are based on psychiatric diagnosis and disturbances related to obesity. We chose the proportion of attended recommended follow-up appointments as the most suitable measure for purposes of grouping variable. As the number of attended appointments was not an appropriate independent variable because the frequency of follow-up appointments was individualized within the range of 1 to 12 weeks according to the patient's medication regimen, level of symptom control, and present level of functioning, the total number of appointments per patient varied. According to the standard cutoff value utilized in adherence research [29, 30], patients who attended above 80 % of their recommended psychiatric treatment and follow-up in a year were classified as "adherence." Patient who missed the follow-up appointment and had not spontaneously rescheduled missed appointment within 2 weeks would be recorded as missing the appointment. Details of the principle of psychiatric evaluation and intervention for our bariatric patients have been reported previously [31].

The patients were divided into four groups according to preoperative psychiatric evaluations and adherence to recommended psychiatric follow-up appointments 1 year after their bypass surgery. The first group included patients who did not meet the referral criteria (NMRC) (i.e., patients whose CHQ and TDQ scores were lower than the cutoff points). The second group was composed of patients who did not meet the psychiatric diagnostic criteria (NMDC) or were suitable for bariatric surgery without psychiatric treatment (i.e., patients whose CHQ or TDQ scores were above the cut-off points but were not given a psychiatric diagnosis or psychiatric treatment recommendations by a psychiatrist). The third group comprised patients who met criteria for a psychiatric disorder and were nonadherent (NA) to the psychiatric follow-up. The fourth and final group consisted of patients who met criteria for a psychiatric disorder and were adherent (A) to the recommended psychiatric follow-up. This study was approved by the Institutional Review Board of E-Da Hospital, Taiwan (EMPR-103-026).

Body Weight and Psychiatric Variables

Data for each patient was collected from the computerized medical record system in the hospital up to a maximum of 1 year following their bypass surgery. Retrospective data obtained included the following: (1) demography (e.g., age, gender, and educational level), (2) pre-surgical evaluations (e.g., BMI, CHQ, and TDQ scores, and psychiatric recommendations), (3) BMI and percentage of change in BMI (% change in BMI) values from the date of surgery to 6 and 12 months post-surgery, respectively. % change in BMI at each

postreferral visit was derived from the following formula: (pre-surgical BMI−current BMI/pre-surgical BMI)×100, (4) the proportion of attended recommended appointments within this 1-year period. Patients who were recommended to undergo psychiatric treatment but were lost to follow-up would be contacted via telephone to ensure that they had received psychiatric treatment at other medical institutions.

Statistical Analyses

All statistical analyses were conducted using IBM SPSS Statistics version 18. The analysis of variance (ANOVA) test was used to evaluate differences for continuous variables and the chi-square test was used to evaluate differences for categorical variables. Logistic regression was applied to examine the relationship between the grouping variable and % change in BMI.

Results

Of the 318 patients, 265 (83 %) were at the 6-month follow-up (range 5–7) and 214 (67 %) at the 1-year follow-up (range 11–13) at the obesity treatment center after surgery. There was a significant difference among the four groups with regard to follow-up rate ($\chi^2=12.7, p=.005$). In the NMRC group, 69/98 patients (70 %) were weighed at the 1-year follow-up; in the NMDC group, 79/120 patients (66 %), in the NA group, 38/69 patients (55 %), and in the A group, 28/31 patients (90 %) were weighed at the 1-year follow-up. Most of the patients were female. There was no difference among the four groups with regard to gender distribution, educational level, age, and preoperative BMI (Table 1). One hundred (31.4 %) of the patients had at least one axis I psychiatric disorder. Mood disorders (64 %), anxiety disorders (47 %), and eating disorders (21 %) were the most prevalent categories of psychiatric disorders (Table 2). In the NA group, three patients had a psychiatric treatment history and five patients were in psychiatric treatment when they received a psychiatric interview for bariatric surgery. In the A group, eight patients had a psychiatric treatment history and one patient in psychiatric treatment when they received a psychiatric interview for bariatric surgery. Results from one-way ANOVA showed that there was a significant difference in 6-month % change in BMI ($F=3.310$, $p=.021$) and 1-year % change in BMI ($F=3.720$, $p=.012$) (Fig. 1) among the four groups. Post hoc analyses showed that the A group exhibited significantly higher % change in BMI than the NMRC group ($p=.021$) at 6 months after surgery and exhibited significantly higher % change in BMI than the NMRC and NA groups ($p=.035$ and $p=.028$, respectively) at 1 year after surgery.

Multiple linear regression analyses to examine the effects of the grouping variable (the four groups) on 6-month and 1-year % change in BMI were conducted by controlling the effects of age, gender, educational level, and preoperative BMI. We added the grouping variable to form model 2. The regression coefficient (beta weight) for the grouping variable was 0.175 ($p=.003$) at the 6-month and 0.133 ($p=.027$) at the 1-year (Table 3) % change in BMI, indicating that adherence to postoperative recommended psychiatric appointments was associated with greater BMI loss after bypass surgery.

Discussion

The present study examined the effects of adherence to postoperative recommended psychiatric follow-up in patients with morbid obesity and psychiatric disorders and who underwent gastric bypass on weight loss after 1 year. The results indicated that morbidly obese patients with comorbid psychiatric disorders who adhere to postoperative recommended psychiatric follow-up exhibited greater postoperative weight loss. Patient adherence to treatment is central to good patient outcomes, perhaps patients who are adherent to psychiatric recommendations may be more willing to be involved in a weight loss program and thus had better weight loss.

Of the 100 patients with an axis I psychiatric disorders in our study, 69 % were nonadherent to psychiatric follow-up

Table 1 Preoperative characteristics as a function of the grouping variable during the 1 year after surgery

Characteristics	Total ($n=318$)	NMRC ($n=98$)	NMDC ($n=120$)	NA ($n=69$)	A ($n=31$)	p
Preoperative						
Gender (% female)	224 (70.4)	70 (71.4)	78 (65.0)	50 (72.5)	26 (83.9)	.157
Education, years	13.8 (2.8)	13.9 (3.0)	13.5 (3.0)	13.8 (2.4)	14.8 (2.4)	.287
Age (years)	33.3 (9.6)	34.6 (10.8)	33.1 (9.2)	31.7 (9.0)	33.4 (8.0)	.272
BMI (kg/m^2)	43.5 (7.9)	42.3 (7.7)	44.5 (8.1)	43.4 (7.7)	41.8 (8.3)	.253

NMRC patients who did not meet the referral criteria, *NMDC* patients who did not meet the diagnostic criteria, *NA* patients who met criteria for a psychiatric disorder and were nonadherent to postbariatric psychiatric follow-up, *A* patients who met criteria for a psychiatric disorder and were adherent to postbariatric psychiatric follow-up, *BMI* body mass index

Table 2 Prevalence of axis I psychiatric disorders by groups

	Total sample of psychiatric patients (n=100)	NA (n=69)	A (n=31)
Mood disorders (%)	64 (64.0)	42 (60.9)	22 (71.0)
Anxiety disorders (%)	47 (47.0)	35 (50.7)	12 (38.7)
Adjustment disorder (%)	6 (6.0)	5 (7.2)	1 (3.2)
Eating disorders (%)	21 (21.0)	16 (23.2)	5 (16.1)
Psychotic disorders (%)	3 (3.0)	0 (0)	3 (9.7)
Alcohol-related disorders (%)	1 (1.0)	1 (1.4)	0 (0)
Sleep disorders (%)	4 (4.0)	1 (1.4)	3 (9.7)

NA patients who met criteria for a psychiatric disorder and were nonadherent to postbariatric psychiatric follow-up, *A* patients who met criteria for a psychiatric disorder and were adherent to postbariatric psychiatric follow-up

after bypass surgery. The follow-up rate at the obesity treatment center of this group (NA) was lower than that of the other groups so did their % of BMI changes. A recent review [32] showed that failure to attend follow-up visits was associated with an increased risk of complications, failure to lose an adequate amount of weight, and poor weight loss maintenance. On the other hand, adherence to follow-up appointments was associated with greater weight loss, even up to 3 years after surgery. Altogether, adherence to psychiatric recommendations and follow-up appointments was closely associated with weight loss outcomes in this population. The NMRC group also exhibited significantly lower % change in BMI than the A group at 1 year after surgery. Although it was not possible to confirm the relationship between psychological distress and overweight in this study, Heinberg et al. speculate that a modicum of body dissatisfaction and distress about overweight may actually be beneficial. They argue that the relationship between body image distress and healthy weight-loss behaviors can be illustrated with a U-shaped curve such that individuals who are completely satisfied with their bodies may not be motivated to attempt weight loss [33]. Thus, alternative strategies, such as emphasis on the health benefits of weight loss, may be needed in order to motivate relatively non-distressed individuals to achieve and maintain a healthy body weight [34].

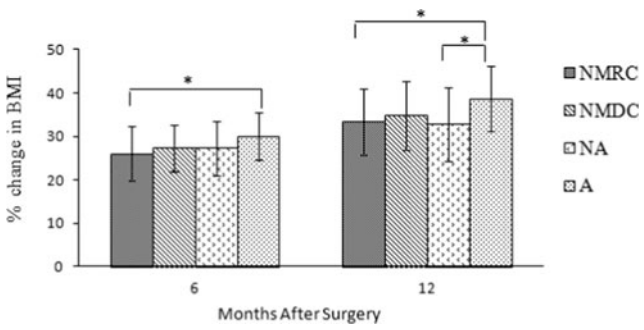

Fig. 1 The percentage of change in BMI (% change in BMI) for the four groups at 6 and 12 months after bypass surgery. A group exhibited significantly higher % change in BMI than the NMRC group at 6 months after bypass surgery. A group exhibited significantly higher % change in BMI than the NMRC and NA group at 1 year after bypass surgery. *NMRC* patients who did not meet the referral criteria, *NMDC* patients who did not meet the diagnostic criteria, *NA* patients who met criteria for a psychiatric disorder and were nonadherent to postbariatric psychiatric follow up, *A* patients who met criteria for a psychiatric disorder and were adherent to postbariatric psychiatric follow up. *p<.05

Our findings are consistent with studies suggesting that the presence of psychiatric disorders should not be an absolute exclusion criterion for surgery [9]. Moreover, better adherence to postoperative psychiatric recommendations could result in better weight outcomes in these patients. The results also clearly support the importance of screening individuals who have an axis I disorder before surgery for better weight loss. Screening of patients with psychiatric disorders could help in identifying those who would benefit from early interventions.

This study has some limitations that should be mentioned. First, the analyses were limited to only 1 year of follow-up after surgery; therefore, our results do not infer the effect of adherence to psychiatric appointments in the longer term. A longer duration of follow-up is needed to evaluate the effect of adherence on weight loss. Further, factors associated with nonadherence to appointments have not been explored in our study. Staff of the obesity treatment center (e.g., surgeon, case manager, nutritionist) has sensitivity and awareness in a patient with problematic emotion or eating behavior, increasing patient education about the importance of psychological intervention. However, in the

Table 3 Multiple linear regression analyses for the contribution of grouping variable to 1-year % change in BMI

Predictor	B	SE	β	p	R^2
Model 1					
Age	−.076	.058	−.014	.194	.262
Gender	−.233	1.063	−.014	.827	
Educational level	.274	.189	.102	.149	
Preoperative BMI	.444	.063	.461	<.001	
Model 2					
Age	−.068	.058	-.085	.238	.280
Gender	−.410	1.056	.024	.699	
Educational level	.245	.188	.091	.193	
Preoperative BMI	.446	.062	.463	<.001	
Grouping variable	1.062	.478	.133	.027	

NA group, the follow-up rates at the obesity treatment center and the department of psychiatry were lower than the other groups in our study. A previous study [35] suggested that patients were less likely to be adherent to treatment that required major behavioral changes, such as smoking cessation, initiation of individual cognitive-behavioral psychotherapy with a medication, or initiation of therapy alone. Patients might have perceived that too much personal change or time was needed. It could be inferred that patients do not understand how severe depression or substance abuse could interfere with their success; thus, they might deny or minimize their symptoms and therefore did not receive treatment for their behavioral problems. Despite some studies suggesting that psychological factors affect treatment adherence [34, 36], others have reported that psychological diagnosis and level of depression or anxious symptoms were not associated with adherence to preoperative treatment plans [37]. Future research could investigate psychological and behavioral factors that might affect adherence to psychiatric and obesity treatment recommendations among bariatric patients and develop tailored interventions to increase adherence.

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

Ethical Approval For this type of study, formal consent is not required.

Informed Consent Not applicable.

References

1. Kalarchian MA, Marcus MD, Levine MD, et al. Psychiatric disorders among bariatric surgery candidates: relationship to obesity and functional health status. Am J Psychiatry. 2007;164(2):328–34.
2. Kessler RC, Berglund P, Demler O, et al. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. Arch Gen Psychiatry. 2005;62:593–602.
3. Muhlhans B, Horbach T, de Zwaan M. Psychiatric disorders in bariatric surgery candidates: a review of the literature and results of a German prebariatric surgery sample. Gen Hosp Psychiatry. 2009;31:414–21.
4. Onyike CU, Crum RM, Lee HB, et al. Is obesity associated with major depression? Results from the third national health and nutrition examination survey. Am J Epidemiol. 2003;158(12):1139–47.
5. Wadden TA, Butryn ML, Sarwer DB, et al. Comparison of psychosocial status in treatment-seeking women with class III vs. class I–II obesity. Obesity (Silver Sprin). 2006;14(2):S90–8.
6. Sarwer DB, Wadden TA, Fabricatore AN. Psychosocial and behavioral aspects of bariatric surgery. Obes Res. 2005;13(4):639–48.
7. Lin HY, Huang CK, Tai CM, et al. Psychiatric disorders of patients seeking obesity treatment. BMC Psychiatr. 2013;13(1):1–8.
8. Herpertz S, Kielmann R, Wolf AM, et al. Do psychosocial variables predict weight loss or mental health after obesity surgery? A systematic review. Obes Res. 2004;12(10):1554–69.
9. van Hout GC, Verschure SK, van Heck GL. Psychosocial predictors of success following bariatric surgery. Obes Surg. 2005;15:552–60.
10. Brunault P, Jacobi D, Miknius V, et al. High preoperative depression, phobic anxiety, and binge eating scores and low medium-term weight loss in sleeve gastrectomy obese patients: a preliminary cohort study. Psychosomatics. 2012;53(4):363–70.
11. Dixon JB, Dixon ME, O'Brien PE. Depression in association with severe obesity. Arch Intern Med. 2003;163:2058–65.
12. Dymek MP, Le Grange D, Neven K, et al. Quality of life and psychosocial adjustment in patients after Roux-en-Y gastric bypass: a brief report. Obes Surg. 2001;11:32–9.
13. Green AE, Dymek-Valentine M, Pytluk S, et al. Psychosocial outcome of gastric bypass surgery for patients with and without binge eating. Obes Surg. 2004;14:975–85.
14. Kinzl JF, Schrattenecker M, Traweger C, et al. Psychosocial predictors of weight loss after bariatric surgery. Obes Surg. 2006;16:1609–14.
15. Averbukh Y, Heshka S, El-Shoreya H, et al. Depression score predicts weight loss following Roux-en-Y gastric bypass. Obes Surg. 2003;13:833–6.
16. de Zwaan M, Enderle J, Wagner S, et al. Anxiety and depression in bariatric surgery patients: a prospective, follow-up study using structured clinical interviews. J Affect Disord. 2011;133:61–8.
17. Kalarchian MA, Marcus MD, Levine MD, et al. Relationship of psychiatric disorders to 6-month outcomes after gastric bypass. Surg Obes Relat Dis. 2008;4(4):544–9.
18. Legenbauer T, de Zwaan M, Mühlhans B, et al. Do mental disorders and eating patterns affect long-term weight loss maintenance? Gen Hosp Psychiatry. 2010;32(2):132–40.
19. Legenbauer T, Petrak F, de Zwaan M, et al. Influence of depressive and eating disorders on short- and long-term course of weight after surgical and nonsurgical weight loss treatment. Compr Psychiatry. 2011;52(3):301–11.
20. Livhits M, Mercado C, Yermilov I, et al. Preoperative predictors of weight loss following bariatric surgery: systematic review. Obes Surg. 2012;22(1):70–89.
21. Pataky Z, Carrard I, Golay A. Psychological factors and weight loss in bariatric surgery. Curr Opin Gastroenterol. 2011;27(2):167–73.
22. van Hout GC, Jakimowicz JJ, Fortuin FA, et al. Weight loss and eating behavior following vertical banded gastroplasty. Obes Surg. 2007;17(9):1226–34.
23. Poole NA, Al Atar A, Kuhanendran D, et al. Compliance with surgical after-care following bariatric surgery for morbid obesity: a retrospective study. Obes Surg. 2005;15(2):261–5.
24. Mason C. Non-attendance at out-patient clinic: a case study. J Adv Nurs. 1992;17:554–60.
25. Kiortsis DN, Giral P, Bruckert E, et al. Factors associated with low compliance with lipid-lowering drugs in hyperlipidemic patients. J Clin Pharm Ther. 2000;23:445–51.
26. Karter AJ, Parker MM, Moffet HH, et al. Missed appointments and poor glycemic control: an opportunity to identify high-risk diabetic patients. Med Care. 2004;42:110–5.
27. Lee Y, Yang MJ, Lai TJ, et al. Development of the Taiwanese depression questionnaire. Chang Gung Med J. 2000;23:688–94.
28. Cheng TA, Williams P. The design and development of a screening questionnaire (CHQ) for use in community studies of mental disorders in Taiwan. Psychol Med. 1986;16(2):415–22.
29. Coodin S, Staley D, Crtens B, et al. Patient factors associated with missed appointments in persons with schizophrenia. Can J Psychiatry. 2004;49(2):145–8.

30. Balikci A, Erdem M, Zincir S, et al. Adherence with outpatient appointments and medication: a two-year prospective study of patients with schizophrenia. BCP. 2013;23(1):57–64.
31. Yen YC, Huang CK, Tai CM. Psychiatric aspects of bariatric surgery. Curr Opin Psychiatr. 2014;27(5):374–9.
32. Galioto R, Gunstad J, Heinberg LJ, et al. Adherence and weight loss outcomes in bariatric surgery: does cognitive function play a role? Obes Surg. 2013;23(10):1703–10.
33. Heinberg LJ, Thompson JK, Matzon JL. Body image dissatisfaction as a motivator for healthy lifestyle change: is some distress beneficial? In: Striegel-Moore RH, Smolak L, editors. Eating disorders: innovative directions in research and practice. Washington, DC: American Psychological Association; 2001. p. 215–32.
34. Judge AM, Thomas JJ, Becker AE, et al. Ethnic disparities in overweight and obesity in the US: a review of socio-cultural contributions. In: Ditmier LF, editor. New developments in obesity research. New York: Nova; 2006. p. 85–119.
35. Friedman KE, Applegate KL, Grant J. Who is adherent with preoperative psychological treatment recommendations among weight loss surgery candidates? Surg Obes Relat Dis. 2007;3(3):376–82.
36. Bosley CM, Fosbury JA, Cochrane GM. The psychological factors associated with poor compliance with treatment in asthma. Eur Respir J. 1995;8(6):899–904.
37. DiMatteo RM, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. Arch Intern Med. 2000;160(14):2101–7.