



The Impact of Massive Weight Loss on Psychological Comorbidities: A Large, Retrospective Database Review

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Received: 30 March 2019 / Accepted: 1 July 2019 / Published online: 9 October 2019

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Abstract

Background The obese population has a higher incidence of mood disorders compared to individuals with normal body mass index (BMI). A better understanding of the unique psychosocial challenges faced by this patient population will allow physicians to better optimize patient psychosocial support systems perioperatively, as well as help the patient to maintain appropriate expectations.

Methods A large, retrospective database of 1135 patients with greater than 50 pounds of weight loss was reviewed. Data were analyzed using a multinomial regression model to determine the influence of psychosocial factors on the incidence of depression and anxiety.

Results Prior to massive weight loss, patients reported an overall incidence of depression and anxiety of 42.5% and 26.3%, respectively. Following massive weight loss, the incidence of depression decreased to 32.3% and the incidence of anxiety decreased to 22.0%. Patients with spousal support and with positive self-image were more likely to experience resolution of depression. Patients with positive self-image were likely to experience resolution of anxiety. Resolution of medical comorbidities correlated with a decrease in the rate of depression.

Conclusion Depression and anxiety are prevalent in the massive weight loss patient population undergoing body contouring surgery. Support systems are a vital resource for patients with psychological comorbidities undergoing

massive weight loss. Patients who have a positive self-image of themselves are more likely to experience resolution of psychological comorbidities. Physicians should consider recommending support groups and/or counseling in patients who have poor support and negative self-image. **Level of Evidence IV** This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Massive weight loss · Psychosocial · Depression · Anxiety · Body contouring

Introduction

Obesity is correlated with an increased incidence of mood disorders compared to individuals with normal body mass index (BMI) [1, 2]. Obese patients who undergo bariatric surgery or achieve massive weight loss through diet and exercise often have an early childhood onset of obesity and, as a result, obesity can become a central pillar in their lives, defining interactions and other aspects of their psychosocial well-being [3]. In addition, obesity and depression are often intertwined, with each comorbidity feeding the other. Thus, the cycle of obesity and psychosocial comorbidity is one which becomes difficult to break.

With the notion of obesity as a vital aspect of this population's self-image, it is unclear how massive weight loss affects psychosocial illness. While there is potential for reversal of medical comorbidities including diabetes, rapid weight loss, as seen with gastric bypass surgery, leaves behind excess skin-related issues, including decreased mobility, sexual dysfunction, and difficult-to-

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treat rashes along redundant skin folds [4, 5]. In addition, after bariatric surgery, increased pain levels, fear of post-operative complications, and decreased serotonin levels in the setting of decreased oral intake can actually increase the incidence of depression [6]. Finally, the multitude of changes associated with weight loss can lead to instability in the patient's day-to-day interactions and self-perception. In the face of this instability, it is vital that these patients have adequate support systems, including spousal support, friendship, and/or support groups.

This paper represents the largest known study investigating psychosocial comorbidities in post-bariatric patients undergoing body contouring surgery. The aim of this study is to define rates of anxiety and depression in the massive weight loss patient population presenting for body contouring surgery and to assess the impact of support systems, marital status, medical comorbidities, and self-image. Results will help physicians better understand the unique psychosocial challenges faced by this patient population allowing for optimization of patient psychosocial support systems in the perioperative period. This, in turn, will provide the framework for improved patient counseling and assistance in forming appropriate expectations prior to further surgical intervention, including body contouring surgery.

Materials and Methods

This study is an IRB-approved (PRO12100449) retrospective review of 1135 massive weight loss patients who underwent body contouring surgery at the University of Pittsburgh Medical Center from 2001 to 2015. Massive weight loss was defined as loss of 50 pounds or more. Data were collected regarding demographics, weight loss history, pre- and post-massive weight loss medical history, surgical history, and social history. Follow-up and complication data were recorded. Psychosocial data included history of depression and/or anxiety prior to and following massive weight loss. Subjects reported self-image via a Likert scale, reflecting feelings about self and appearance following massive weight loss. The presence of support in the form of support groups, spouse, and family was identified by subjects. Subjects indicated marital status as single, married, divorced, separated, or widowed.

Data were analyzed using a multinomial regression model to determine the influence of psychosocial factors on the incidence of depression and anxiety following massive weight loss. Significance was defined at an $\alpha = 0.05$.

Results

A total of 1135 massive weight loss patient charts were retrospectively reviewed. The mean age was 49 (range 18–85), and 85% were female. Eighty-four percent of patients lost weight through bariatric surgery with the remaining 16% achieving weight loss through diet and exercise. The most common comorbid medical conditions included diabetes mellitus, hypertension, and coronary artery disease (CAD) (Table 1).

Depression

Prior to massive weight loss, patients reported a 42% incidence of depression, which decreased to 32% following massive weight loss ($p < 0.001$). Gender did not influence

Table 1 1135 patient charts were reviewed with the demographic breakdown demonstrated

	<i>N</i>	Mean
Age	1135	49
BMI		
Pre-MWL		52.3
Current		30.2
	<i>N</i>	%
Obesity onset		
12 and under	280	45.4
13–18	88	14.3
19–25	112	18.2
26–35	89	14.4
Over 35	48	7.8
Gender		
Male	115	10.1
Female	966	85.1
Weight loss method		
Surgical	954	84.1
Non-surgical	181	15.9
Pre-MWL history		
Depression	482	42.5
Anxiety	298	26.3
Diabetes	282	24.8
Hypertension	527	46.4
CAD	44	3.9
Medications		
Anti-depressants	388	34.2
Anti-psychotics	36	3.2
Tobacco history		
Active	128	11.6
Quit	334	30.2
Never	645	58.3

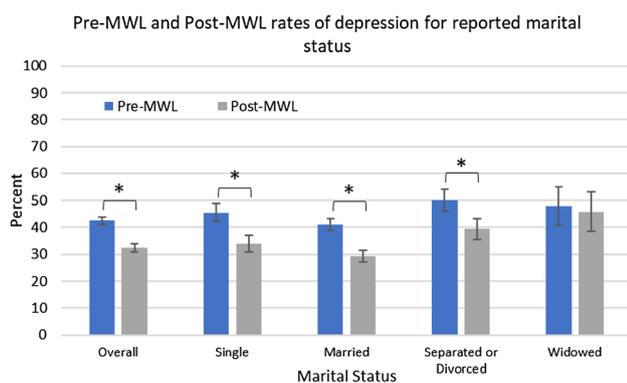


Figure 1 The impact of marital status on rates of depression prior to and following massive weight loss. * $p < 0.05$

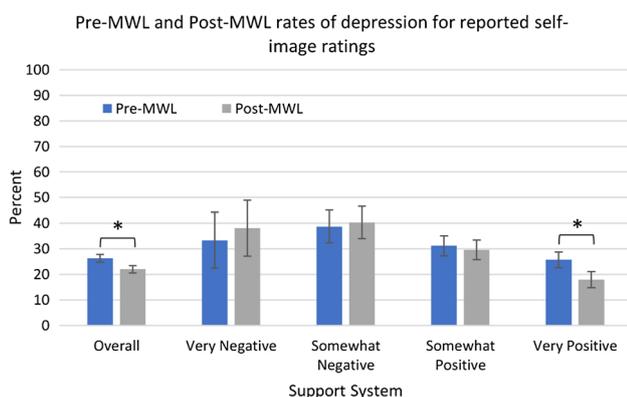


Figure 2 The relationship between self-image and rates of anxiety prior to and following massive weight loss. * $p < 0.05$

rates of depression prior to MWL and was not related to diminished rates of depression following massive weight loss. Resolution of chronic comorbid conditions led to a reduction in the incidence of depression with massive weight. For example, after MWL, patients with continued diabetes had a stable rate of depression (pre-MWL 47%, post-MWL 45%, $p = 0.38$). Patients who resolved their diabetes through massive weight loss experienced a significant decrease in the rate of depression from 46 to 31% ($p = 0.002$). Patients with a relationship status of ‘widowed’ had stable rates of depression following massive weight loss compared to significant decreases in rates of depression in those who were married or single (Fig. 1). Patients with spousal support were more likely to resolve depression following massive weight loss (Fig. 2) (Chi-square 8.18, $Pr > ChiSq$ 0.004). Multivariate analysis revealed a correlation between diminishing rates of depression following massive weight loss and positive self-image (Chi-square 23.74, $Pr > ChiSq < 0.001$). Although relatively few subjects reported lack of support system, rates of depression were higher in this subgroup compared to subjects who reported the presence of a support system.

Similarly, subjects who reported a negative self-image also reported a higher incidence of depression prior to massive weight loss. Though rates of depression appeared to decrease regardless of pre-weight loss self-image, this decrease was not significant for the subpopulation reporting negative self-image (Table 2).

Anxiety

Prior to massive weight loss, patients reported a 26% incidence of anxiety, which decreased to 22% following massive weight loss ($p = 0.009$). Marital status did not predict the impact of massive weight loss on incidence of anxiety, though there was a significant decrease in the rate of anxiety after massive weight loss in patients who were married ($p = 0.05$). Patients who had positive self-image had significantly lower rates of anxiety after MWL ($p = 0.02$). This was also observed using multivariate analysis (Chi-square 14.83, $Pr > ChiSq$ 0.002). Similar to the results observed for rates of depression, resolution of chronic disease, such as diabetes, led to a significant decrease in the rate of anxiety after massive weight loss (pre-MWL 32%, post-MWL 25%, $p = 0.05$). Though insignificant, rates of anxiety in subjects reporting negative self-image increased following massive weight loss.

Conclusion

This research represents the largest known study assessing psychosocial comorbidities in the massive weight loss body contouring patient population. The findings generated through analysis of this data will allow for physicians to provide obese patients with realistic expectations pertaining to their psychosocial medical problems following massive weight loss as well as provide the information needed to empower physicians and patients to optimize outcomes.

Discussion

This study assessed the impact of support systems, marital status, medical comorbidities, and self-image on resolution of mood disorders after massive weight loss. Obese individuals have an elevated prevalence of major depression, bipolar disorder, panic disorder, and agoraphobia [7]. Comorbid depression and obesity are intertwined, with both diagnoses playing a role in the development of the other—and it is unclear which diagnosis predominantly drives the other. In the massive weight loss patient population, most patients identify their childhood as the time at which their problems with weight gain began, so in this

Table 2 Rates of depression and anxiety decreased significantly following massive weight loss, and this decrease was significant among multiple subpopulations within the examined data set

	Depression			Anxiety		
	Pre-MWL	Post-MWL	<i>p</i> value	Pre-MWL	Post-MWL	<i>p</i> value
Overall	42.5	32.3	< 0.001	26.3	22.0	0.009
Gender						
Male	39.1	30.4	0.08	22.6	19.1	0.26
Female	42.9	32.8	< 0.001	26.8	22.6	0.02
Weight loss method						
Surgical	49.6	32.8	< 0.001	27.4	23.7	0.02
Non-surgical	34.8	25.4	0.01	20.4	16.6	0.07
Pre-MWL history						
Diabetes	46.1	35.5	0.005	31.9	27.0	0.09
Hypertension	28.5	33.8	< 0.001	28.7	22.8	0.01
CAD	50.0	40.9	0.20	29.5	27.3	0.41
Marital status						
Single	45.5	33.9	0.005	27.3	22.7	0.12
Married	41.0	29.2	< 0.001	23.8	19.8	0.05
Divorced	48.3	38.9	0.05	35.8	28.9	0.11
Widowed	47.9	45.8	0.42	25.0	31.3	0.25
Support system						
Spouse	35.4	25.9	0.02	22.2	20.6	0.35
Friend	44.4	34.9	0.04	30.8	30.8	0.50
Support group	44.4	24.4	0.02	31.1	26.7	0.32
None	75.0	50.0	0.17	37.5	25.0	0.31
Self-image						
Very negative	66.7	52.4	0.18	33.3	38.1	0.38
Somewhat negative	58.1	46.8	0.11	38.7	40.3	0.43
Somewhat positive	37.1	29.0	0.05	31.2	29.6	0.41
Very positive	42.8	30.0	0.001	25.7	17.9	0.02

population, it is likely that the social implications of morbid obesity play a significant role in the development of mood disorders. For example, morbidly obese patients are more likely to be divorced or single, and for married patients, rates of marital disharmony are higher compared to normal-weight adults. In a study by Rand et al. [8] morbidly obese patients were most often married (54.6%) or single (24.4%) and 16% of patients were separated or divorced. Our study population of morbidly obese patients presenting for body contouring surgery had a rate of depression of 42% prior to weight loss. This decreased significantly following MWL to 32%; however, this is still higher than 5.4% in the general population [9].

A study by Song et al. reported improved self-image in patients following body contouring surgery; however, quality of life (QoL) and mood were not improved. The study was limited by a small number of enrolled patients but was able to identify a trend toward improvement of mood following body contouring surgery [10]. A larger study found improvements in multiple subcategories of QoL including self-esteem, physical activity, social life,

work ability, sexual functioning, and approach to food one year following bariatric surgery. In the long term, improvements in physical QoL appear to be sustained, while improvements in mental QoL may not continue [11]. Given this information, it is possible that the patient population examined in this study generated an underestimate of the long-term rate of depression following massive weight loss.

Prior to massive weight loss, reported rates of depression and anxiety were highest in those individuals lacking a support system. Conversely, the presence of a support system, including friends, family, or a support group, was associated with a significant decrease in the rate of depression following MWL. Similarly, the data demonstrate a significant decrease in the rate of depression following massive weight loss in subjects reporting positive self-image, while there was no significant difference observed in the rate of depression in subjects with negative self-image. Based on this observation, the authors recommend counseling patients to seek out support and to consider joining a support group prior to attempting massive

weight loss. For patients reporting negative self-image, the authors recommend further questioning to determine the underlying cause of the individual's negative self-perception. It is possible that self-image could improve by participating in support groups or undergoing formal counseling. By optimizing the patient's psychosocial situation through recommendations including seeking out support systems and/or undergoing psychological or marital counseling, post-massive weight loss outcomes may improve from a psychological standpoint. Ultimately, this improvement would lead to further psychosocial stability in the patient population presenting for body contouring surgery.

Limitations to this study must be acknowledged. Results are based on patient-reported data with an inherent propensity of recall bias and the potential that patients may report what they believe the physician wants to hear. Simple questionnaires were used in lieu of formal patient-reported outcome measures (PROMs) including the BODY-Q. In the future, PROMs could be used to better understand the impact of body contouring on psychosocial measures. Patients did not undergo formal psychiatric evaluation. Thus, there is a possibility that some reported psychiatric comorbidities do not meet DSM-5 criteria for diagnosis. Future studies will include longitudinal prospective assessments of psychosocial measures at multiple time points including pre-weight loss, post-weight loss, and post-body contouring surgery.

Acknowledgements The authors thank the Clinical and Translational Science Institute (CTSI) for their assistance with data analysis.

Compliance with Ethical Standards

Conflict of interest The authors deny commercial interest in the subject of study and deny financial or material support for this study. The authors declare that they have no conflict of interest.

Ethical Statement All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964

Helsinki Declaration and its later amendments or comparable ethical standards.

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