The Impact of Bariatric Surgery on Anxiety Symptoms

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Abstract

Anxiety and obesity are both major public health problems, affecting millions of people of all ages and cultures. Whereas anxiety is reported more in developed countries, where it is the most prevalent mental disorder, obesity is one of the most prevalent global public health disorders. The connection between obesity and anxiety is a complex one, with the emotional eating being one of the many plausible mediators that act between these two major health issues. Thus, in this study we tried to see if there is a correlation between these two aspects, as studied in patients which were hospitalized for laparoscopic sleeve gastrectomy surgery. In this way, although the results of our study do not support the idea that individuals with anxiety symptoms loose less weight compared to their healthy counterparts, close surveillance of these patients is still needed to help identifying populations at risk, which would benefit from adjunctive interventions that target anxiety in patients who show no reduction in these symptoms after the procedure. The important results of our study showed a reduction in the number of patients with severe anxiety and in those with mild to moderate symptoms after the bariatric procedure which will likely result in a positive health outcome of these patients.

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Introduction

Anxiety and obesity are both major public health problems, affecting millions of people of all ages and cultures. Whereas anxiety is reported more in developed countries, where it is the most prevalent mental disorder, obesity is one of the most prevalent global public health disorders (Lykouras & Michopoulos, 2011). The prevalence of obesity globally is in a continuous rise and has been attributed to lifestyle factors, often arising from urbanization, that encourage the accumulation of excess calories through a sedentary lifestyle and an excessive food intake (Zhang & Wang, 2012).

The connection between obesity and anxiety is a complex one. Emotional eating is one of the many plausible mediators that act between these two major health issues. The "emotional eating" term was first introduced in the psychosomatic theory, which considered overeating as a coping mechanism to regulate and reduce negative emotions (Ganley, 1989; Braet, Claus, & Goossens, 2008). This reaction, however, is not evolutionarily advantageous or biologically appropriate, given that a reduction in food intake, not an increase, in the face of stress is expected. In particular, the stress-induced flight-or-fight response of the hypothalamic-pituitary-adrenal axis should decrease physiological hunger. In terms of anxiety, emotional eating may be a way of dealing with hyperarousal (Braet, Claus, & Goossens, 2008).

There are many options to treat severe obesity and associated comorbidities. First type of treatment includes lifestyle modification such increasing physical activities, changing the food choices, all to achieve a caloric deficit and to start to lose body fat. The second type of treatment includes psychosocial intervention, medications, and bariatric surgery. However, changes in the lifestyle of obese individuals rarely last. This is due to poor diet adhering, lack of education in the sports science area and not last due to a busy schedule and chaotic daily programs (Sacks, Bray, & Carey, 2009; Li, Maglione, & Tu, 2005). On the other hand, there is extensive evidence that bariatric surgery is safe and highly effective in reducing body fat and, therefore, obesity-associated comorbidities and mortality (Buchwald, Avidor, & Braunwald, 2004; Sjostrom, Peltonen, & Jacobson, 2012). Thus, the rise of the number of obese individuals who choose the bariatric treatment is due to the obesity epidemic, along with unsuccessful nonsurgical weight-reduction programs (Padwal, Brocks, & Sharma, 2010).

Despite the flourish of the bariatric surgery over the past two decades there is still no consensus on the criteria for psychological assessment of patients who sign up for this type of surgical intervention. Although there are relatively many studies on the subject, there is still no unanimity in the results on the influence of bariatric

surgery on the psychological behavior of patients or how this type of procedure may influence the psychological traits of the treated patients (Herpertz *et al.*, 2004; Andersen *et al.*, 2010). Thus, as the number of patients undergoing bariatric surgery increases, so does the need to understand how psychiatric symptoms may influence the results of the operation and the other way around, how the operation itself may influence the post-surgery psychiatric health of the patients (Munoz *et al.*, 2007; Dymek *et al.*, 2002).

Methods

The sample of this study was formed from 7 patients (4 men and 3 women), all Romanians, who were hospitalized for laparoscopic sleeve gastrectomy surgery in the Surgery Service, "Sf. Spiridon" Clinical Emergency Hospital in Iasi (Romania). Patients who participated in this study self-reported by telephone the patient-administered version of the Zung Self Rating Scale for Anxiety. Despite its simplicity, the Zung Self Rating Scale for anxiety is widely used in the psychiatric field. It is not considered a replacement for a professional diagnosis, but has been proven internally reliable in many different tests and continues to be used in the clinical field. The rating scale is scored from 1 to 4 points. Most answers go in order of 1 (a little of the time) to 4 (most of the time). However, questions 5, 9, 13, 17, and 19 are scored in the opposite order, since they represent positive/non-anxiety statements.

Scores are then calculated and individuals are given the following results: (1) 20-44 Normal Range; (2) 45-59 Mild to Moderate Anxiety Levels; (3) 60-74 Marked to Severe Anxiety Levels; (4) 75-80 Extreme Anxiety Levels.

This scale was self-administered before and 12 months after the laparoscopic sleeve gastrectomy. It should be noted that none of our participants scored in the Extreme Anxiety Levels range before or 12 months after the operation. All patients from this study were operated through the laparoscopic sleeve gastrectomy procedure. The surgery involved a longitudinal resection of the stomach on the greater curvature from the antrum starting opposite of the nerve of Latarjet up to the angle of His. In the first part of the procedure was to divide the vascular supply of the greater curvature of the stomach, which was achieved with the section of the gastro-colic and gastro-splenic ligaments close to the stomach. Then, the greater curvature was completely freed up to the left crus of the diaphragm to completely resect the gastric fundus that harbours the ghrelin secreting cells of the stomach. The second part of the operation was the longitudinal gastrectomy that "sleeved" the stomach to reduce it to a narrow tube. A naso-gastric tube was used to obtain a precise calibration and to avoid stenosis of the gastric plasty.

Results

Baseline Data

At baseline, before patients underwent laparoscopic sleeve gastrectomy surgery, 13.3% patients scored below the cut-off score of the scale and were considered to be in the normal range of anxiety. The majority of our sample patients (46.6%) presented mild to moderate anxiety levels. Furthermore 40% scored in the severe anxiety levels range of the test.

In addition, our analysis showed that there was no significant connection between the anxiety level and the Body mass index p= 0.982. The mean (±SD) BMI for anxiety groups was the following: For the normal range group 42.9 (±4.5) kg/m^2, for the mild to moderate group 43.3 (±6) kg/m^2 and for the severe group 43.2 (±7) kg/m^2 (*Figure 1*).

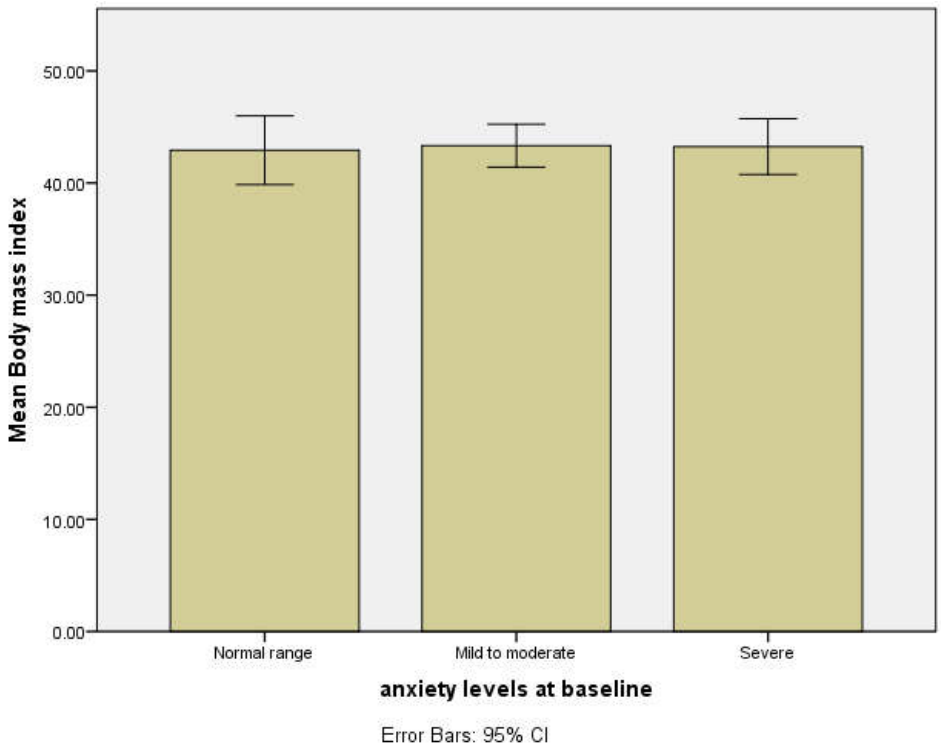

Figure 1. No significant differences between our three anxiety levels groups regarding BMI before laparoscopic sleeve gastrectomy.

After 12 months data

12 months after the laparoscopic sleeve gastrectomy the distribution in the three anxiety groups changed. 42.2% scored in the normal range of the anxiety test, the majority of the patients still scored in the mild to moderate range. However, only 11.1% of the patients still presented severe symptoms of anxiety 12 months after the bariatric procedure. The percentage of patients with mild to moderate symptoms of anxiety remained equal at 46.6%. The same as at baseline, there was still no significant difference regarding the BMI in the three distinct anxiety level groups p=0.688. The mean (±SD) BMI for anxiety groups 12 months post-surgery was the following: For the normal range group 30.1 (±4.7) kg/m^2, for the mild to moderate group 29.4 (±5.4) kg/m^2 and for the severe group 30.9 (±5) kg/m^2 (Fig.2).

Furthermore, the paired sample T-test analysis showed a significant difference ($p< 0.01$) between the anxiety scores before and after laparoscopic sleeve gastrectomy.

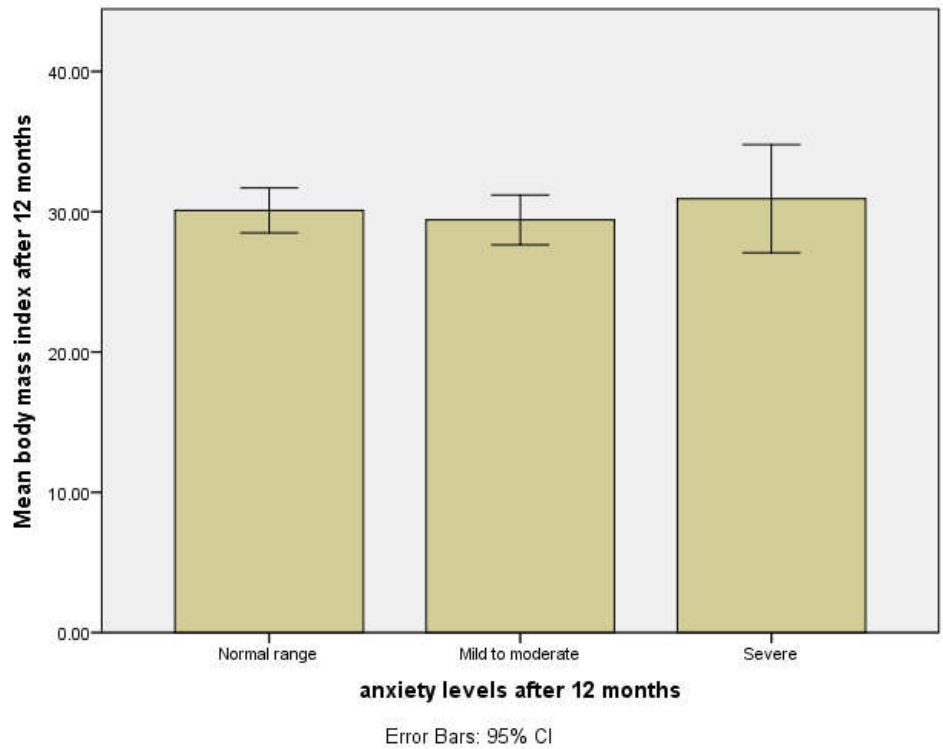

Figure 2. No significant differences between our three anxiety levels groups regarding BMI 12 month after laparoscopic sleeve gastrectomy.

Discussion

There are many studies on the relationship between obesity and comorbid psychiatric conditions (Mitchell *et al.*, 2012). It is important that the bariatric programs include pre-surgical assessment and treatment of psychiatric conditions due to concerns of the possible negative impact of these conditions on bariatric surgery's outcomes (Tsuda *et al.*, 2009; Santry *et al.*, 2006). Among various psychological behaviors, the relationship between mood and the outcome of the bariatric procedure, in term of weight loss, has received a great deal of attention (Legenbauer *et al.*, 2009). The results of these studies on mood disorders show that mood symptoms are good predictors for post-surgical weight loss, quality of life, and poorer post-surgical outcomes (Kinzl *et al.*, 2006; 2007). Interestingly, the data shows that anxiety is present in up to 48% of pre-weight loss surgery candidates and it is identified as the most common psychological disorder present before the operation's psychological evaluation (Andersen *et al.,* 2010; Rutledge *et al.*, 2011). Despite being more prevalent, the symptoms of anxiety in pre-surgical candidates are less understood and have received less attention in the literature than mood symptoms.

Currently, obesity is the most common preventable chronic disease in the world, as its prevalence has increased alarmingly. Bariatric surgery has emerged as a new and effective treatment of this disease. The effectiveness of bariatric surgery has been studied and proven in several meta-analyses. The results of these studies confirmed that surgery is clearly more efficient in inducing weight loss and improving comorbidities than any other nonsurgical therapy (Buchwald, Estok, & Fahrbach, 2009; Shekelle, Morton, & Maglione, 2004; Garb *et al*., 2009). However, it is important to mention that a small percentage of patients treated with bariatric interventions fail to lose significant amount of weight after the operation and one possible explanation may lie in the psychological factors and not necessarily in to the surgery's technical factors (Ning, Wang, & Giovannucci, 2010; Sturm *et al.*, 2003). From this hypothesis comes the importance of our study. It is essential to study the behavior changes that bariatric surgery can generate on patients, but also to measure in which way the psychological traits of an individual may influence the outcome of the operation (Yusuf, Hawken, & Ounpuu, 2005; Buchwald, Estok, & Fahrbach, 2009).

In our study the bariatric procedure influenced the anxiety levels in the all patients investigated. The number of patients who presented severe symptoms of anxiety decreased form 40% to 11.1%. Although the number of patients with mild to moderate anxiety remained the same 12 months after the operation, it is important to mention that none of the all patients increased their anxiety level in this period of time. All of the 11.1% of patients who still had severe symptoms of anxiety 12 months post laparoscopic sleeve gastrectomy, experienced the same level of anxiety symptoms at the beginning of the study, at baseline before the operation. Furthermore, 28.9% of our sample decreased their anxiety levels

from sever to mild to moderate or even to a normal range. These results are in agreement with the results found in the majority of other similar studies. The available data reports a significant decrease in anxiety rating scores after any type of bariatric procedure. However, in the available literature, there is usually a positive association between the decrease in anxiety scores and the amount of weight loss (Karlsson *et al.*, 2007). In our sample such an association was not found. Patients with different levels on anxiety did not lost weight in significant different amounts. The level of anxiety symptoms had no significant influence on the amount of weight lost by all participants 12 months after the laparoscopic sleeve gastrectomy.

Although, as before mentioned, the majority of the studies show a significant influence of anxiety on the bariatric surgery's outcome, there is not a consensus in these results. For example, a study on German obese patients showed a prevalence of anxiety disorders of 18.5% before the operation (Baumeister & Harter, 2007). Interestingly, the prevalence of anxiety disorders did not decrease significantly after surgery in this study. There are relatively few studies that measure how anxiety symptoms alone influence bariatric procedure's outcome, or how anxiety levels increase or decrease after this type of surgical procedure. Most common are the studies which test these hypotheses in connection with other disorders such as depression or in connection with the patients' quality of life in the follow up after the bariatric surgery. This is important to mention for the reason that these studies usually show that after bariatric surgery the symptoms of depression show larger reductions than the symptoms of anxiety (Burgmer *et al.*, 2007; Andersen *et al.*, 2010). For example, in a study with a long time follow up, the results reported by the authors showed that the overall decrease of the anxiety scores from baseline to the 10 year follow-up did not differ between surgery and control subjects. Furthermore, as opposed to the depression subscale scores, no significant long-term relationship was observed between the anxiety symptoms and body fat loss. Although, this study has a longer period of follow up, the results are similar to those in our sample. As before mentioned, the association between anxiety and obesity has been investigated less thoroughly compared to the association between depression and obesity, but there is evidence that weight loss may have a different effect on depression when compared to the effect on anxiety symptoms (Karlsson *et al.*, 2007).

This difference may come from the diverse nature of anxiety symptoms, which may add further complexity to understanding the role of anxiety in the outcome of the an bariatric procedure. Many of the clinical anxiety's symptoms such as cognitive, somatic, affective, and behavioral impairments are also common to various medical conditions, such as type II diabetes, cardiovascular disease, cancer, asthma, and osteoarthritis (Guh *et al.*, 2009). The issue arises when these physiological symptoms overlap with symptoms of anxiety, such as fatigue, shortness of breath, heart palpitations, chest tightness, sweating, and pain. As a result, it is difficult to differentiate when patients report any of the above symptoms,

if the symptoms are due to their current physiology, a co-morbid medical condition, an underlying psychological condition, or any combination of these variables. All this data highlights the unique role that anxiety may play in the outcome of bariatric procedures. Furthermore, it raises the need for a continuum exploration of cognitive and physiological anxiety symptoms in this population (Wedin *et al*., 2012).

In addition, oxidative stress could be also a contributing factor in the relations which are established between anxiety and obesity, with previous studies describing the importance of oxidative stress in obesity and metabolic disorders (Timofte *et al*., 2016), as well as the connections between anxiety and affective disorders vs. the oxidative metabolism (Balmus *et al.*, 2016; Ciobica *et al.*, 2010). In this context, we could also mention the importance of exercising performing, with studies showing that it can reduce anxiety-related manifestations (Stonerock *et al.*, 2015), in both animal models (Arcan *et al.*, 2014) and specific patients (Ciobica *et al.*, 2017; Anton *et al.*, 2015) or in relation with other factors such as oxidative stress status modifications, as it was previously showed (Trofin *et al.*, 2014; 2017).

Conclusions

Thus, although the results of our study do not support the idea that individuals with anxiety symptoms loose less weight compared to their healthy counterparts, close surveillance of these patients is still needed to help identifying at-risk populations who would benefit from adjunctive interventions that target anxiety in patients who show no reduction in these symptoms after the procedure. The important results of our study showed a reduction in the number of patients with severe anxiety and in those with mild to moderate symptoms after the bariatric procedure which will likely result in a positive health outcome of these patients.

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