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EATING DISORDERS (S WONDERLICH AND S ENGEL, SECTION EDITORS)

Depression and Suicide After Bariatric Surgery

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Abstract

Purpose of Review Individuals with morbid obesity benefit from bariatric surgery with respect to weight loss and decreases in obesity-related somatic disorders. This paper focuses on psychosocial outcomes and provides a narrative review of recent meta-analyses and controlled studies concerning postoperative depression and suicide.

Recent Findings Considerable evidence shows short- and medium-term improvement in depressive symptoms after surgery. However, a subgroup of patients exhibits erosion of these improvements or new onset of depression in the long run. Some studies have found an increased risk for suicide among postoperative patients.

Summary Prospective longitudinal examinations of factors contributing to the increased risk for postoperative depression and suicide and the interaction between these factors are warranted. The inclusion of mental health professionals in bariatric teams would help to monitor patients for negative psychosocial outcomes and to identify those patients who are vulnerable to depression, suicide, and any other forms of deliberated self-harm following surgery.

Keywords Bariatric surgery · Obesity · Depression · Suicide

Introduction

An increase in the prevalence of obesity has become a worldwide public health problem [1]. According to the National Health and Nutrition Examination Survey (NHANES), the age-standardized prevalence of obesity (body mass index; BMI ≥ 30 kg/m^2) in US adults increased from 33.7% in 2007–2008 to 39.6% in 2015–2016 [2]. Obesity is associated with chronic weight-related somatic comorbidities such as type 2 diabetes and metabolic syndrome, cardiovascular diseases, obstructive sleep apnea, osteoarthritis, gastroesophageal reflux disease, hepatobiliary diseases, and polycystic ovary syndrome. Individuals with obesity exhibit impairment in health-related quality of life and reduction in life expectancy [3, 4]. Longitudinal studies indicate that obesity remains largely refractory to conventional treatment approaches [5, 6]. Surgical treatment of obesity usually results in effective and durable weight loss, improvements in weight-related somatic comorbidities, increase in physical health-related quality of life and improved long-term survival [7–10]. Bariatric surgery is recommended for individuals with class 3 obesity (BMI ≥ 40 kg/m^2) and for patients with class 2 obesity (BMI ≥ 35 kg/m^2) and weight-related somatic comorbidity [11].

It is well known that many bariatric surgery candidates suffer from mental health disorders, particularly depression and binge eating disorder [12]. With regard to current depression, a meta-analysis showed that its prevalence among patients seeking surgical treatment for obesity exceeds published prevalence rates in the general US population (19% vs. 8%, respectively) [12]. Bariatric surgery candidates may suffer from equally high levels of depression as psychiatric inpatients [13]. A recent meta-analysis suggests that preoperative depression scores do not predict postoperative weight change [14], but weight loss after bariatric surgery is related to short- and medium-term decrease in depression levels [15–17]. While the latter outcome is encouraging, long-term follow-up data suggest that some postoperative patients do not experience psychological benefit or they report de novo development of depression or the return of depressive symptoms that have initially improved after surgery [18]. Elevated levels of depression post-surgery may contribute to the experience of suboptimal outcomes after surgery, including unsatisfactory weight loss or weight regain, comorbid psychopathology,

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and reduced health-related quality of life [19, 20]. A growing body of literature indicates an increased risk for suicidal ideation, suicide attempts, and completed suicides following bariatric surgery [21–24]. Therefore, the present article will address post-surgery depression and suicide, focusing on recent meta-analyses and controlled studies. After a summary of recent studies concerning short- to medium-term as well as long-term bariatric surgery outcomes regarding postoperative depression, recent literature concerning postoperative risk for suicide will be summarized and recommendations for further studies and clinical care will be provided.

Post-surgery Depression: Short- to Medium-Term Outcomes

Dawes and colleagues conducted a systematic review to investigate a variety of outcomes post bariatric surgery, such as the link between bariatric surgery and the clinical course of mental health conditions, including depression [12]. They found lower rates and fewer symptoms of depression post-surgery compared to pre-surgery in 11 of 12 studies. Ten of those were prospective studies with follow-ups ranging from 1 to 7 years (majority of studies with 1-year follow-up). Half of the studies reported high (i.e., 80% at the primary endpoint) and the other half moderate (i.e., 60–80%) follow-up response rates. The authors highlighted the observational cohort study from the Longitudinal Assessment of Bariatric Surgery (LABS) consortium because of its excellent quality due to the large sample size, multi-center design, high follow-up rates of more than 80% at primary endpoint, and adjustment for confounding variables [12]. The LABS study included 2148 bariatric surgery recipients who completed the Beck depression inventory (BDI) [25] prior to surgery and at more than one follow-up time point over a period of 3 years after surgery [26]. The main result was that the self-reported symptom severity of depression was significantly lower at all follow-up visits compared to the baseline. However, after the first postoperative year, the BDI scores increased, suggesting some, albeit small, deterioration of depressive symptoms. As expected, change in depressive symptoms correlated with change in BMI [26].

The findings of Dawes et al. (2016) were supported by a recently published meta-analysis. Corresponding with the aforementioned results, 13 out of 14 prospective studies reported significant reductions in depressive symptoms at 2–3 years after surgery [14]. Taken together, short- and medium-term data suggest postoperative improvement in depression in the majority of patients after bariatric surgery. It appears that successful weight loss is related to decrease in depressive symptoms, which is in line with the proposed bi-directional link between obesity and depression [27]. A complex array of factors should be considered in the explanation for this outcome. The link between decrease in BMI and improvement in depressive symptoms post-surgery may be explained by several biological and psychosocial pathways, e.g., resolved weight-related physical conditions (reduction in inflammation, insulin resistance, HPA-axis dysregulation, etc.), more activities in daily life, satisfaction with body image, enhanced cognitive functioning, and better quality of partnership and sexual functioning [27–33].

Post-surgery Depression: Long-Term Outcomes

The results of the controlled German multi-center Essen-Bochum Obesity Treatment Study (EBOTS) limit the enthusiasm regarding the promising short- and medium-term outcomes of bariatric surgery mentioned above [34]. In the EBOTS, bariatric surgery patients ($n = 152$) exhibited a significant initial postoperative improvement in depressive symptoms measured with the Hospital Anxiety and Depressions Scale (HADS) [35] at the 2-year follow-up, but they showed slight increases of depression scores at the 4-year assessment and erosion between the 4 and 9-year follow-up with HADS depression scores comparable to presurgical level [34, 36].

A recent large-scale 12-year cohort study from Taiwan reported similar results. The study investigated the prevalence of major depressive disorder (MDD) in patients who received bariatric surgery between 2001 and 2009 using the National Health Insurance Research Database of Taiwan [37•]. Bariatric surgery patients who had a diagnosis of depression before surgery were excluded from the analyses. The remaining surgery patients ($n = 2302$) were matched by propensity score to 6493 persons with morbid obesity who did not undergo surgical treatment for obesity (=control group). Cox proportional hazard regressions were calculated to assess the risk of MDD in the surgical group compared to the control group (using adjusted hazard ratios [aHRs] and 95% confidence intervals [CI]) [37•]. The findings suggest a 1.70-fold higher risk of MDD in bariatric surgery recipients compared to controls (aHR = 1.70, 95% CI 1.27–2.27), with patients who underwent malabsorptive procedures (e.g., high gastric bypass, laparoscopic gastroenterostomy) having a higher risk of MDD (aHR = 3.01, 95% CI1.78–5.09) than those receiving restrictive procedures (e.g., laparoscopic sleeve gastrectomy, laparoscopic gastroplasty) (aHR = 1.51, 95% CI 1.10–2.07) and at time points more than 4 years after surgery (aHR = 2.92; CI 1.75–4.88) [37•].

Taken together, recent research confirms earlier reports concerning the erosion of short- and medium-term improvement in depression levels in a subgroup of patients undergoing bariatric surgery.

Post-surgery Suicide

With regard to pre-surgery suicide attempts, a retrospective chart review including data from 1020 consecutive bariatric surgery candidates indicated a rate of previous suicide

attempts of 11.2% [38]. Another study investigated the lifetime prevalence of deliberate self-harm, including suicide attempts, in a sample of bariatric surgery candidates ($n = 139$) compared to a control group of individuals with class 2 or 3 obesity from a German community sample ($n = 122$) [39]. The two groups did not differ with respect to rates of lifetime suicide attempts (9.4% and 12.4% for preoperative patients and control participants, respectively) [39].

Lim and colleagues investigated the prevalence of suicide post-surgery by conducting a meta-analysis based on 61 studies ($n = 142{,}356$ patients) [40]. The pooled postoperative suicide-prevalence of 0.3% was lower than expected [40]. It remained below the global suicide rate (1.4%) published by the World Health Organization [41]. The result is surprising given the literature concerning an increased risk for suicide in postoperative bariatric surgery patients [22–24, 42]. It is important to note that the prevalence rates of mortality and other variables in the meta-analysis of Lim et al. showed significant heterogeneity across studies, which might have limited the generalizability of outcome. Information on follow-up intervals was available from 44 of the 61 studies, ranging from 12 to 280 months. Meta-regression analysis on the sources of heterogeneity for the prevalence of mortality among bariatric surgery cohorts with reported suicide mortality revealed that BMI and follow-up interval were significant predictors, while age and gender were not.

The bariatric surgery literature is marked by a limited range of long-term longitudinal studies that assessed suicidal ideation, suicide attempts, and completed suicides. Most studies concerning the postoperative risk for suicide relied on national patient registers covering psychiatric and/or somatic inpatient contacts and incidences of emergency visits due to deliberate self-harm and suicide attempts. The register-based studies and recent meta-analyses are alarming because they confirm earlier reports about an elevated risk of suicide following surgery [22–24, 42]. Castaneda and colleagues conducted a meta-analysis concerning the risk of suicide in postoperative samples [43••]. They analyzed 32 studies from several countries ($n = 148{,}643$ individuals), including case-control and longitudinal studies. The rate of suicide post-surgery was 2.7/1000 patients (95% CI 0.0019–0.0038) [43••]. Case-control studies ($n = 5$) reported an increased risk of suicide in bariatric surgery recipients compared to age-, gender-, and BMI-matched control participants (OR 3.8, 95% CI 2.19–6.59) [43••]. Longitudinal studies ($n = 3$) with a total sample of 43,406 patients showed that the risk for self-harm or suicide attempt was increased following bariatric surgery compared to baseline rates within the same population (mirror-image analysis; OR 1.9, 95% CI 1.23–2.95) [43••].

Worthy of note is a publication from Sweden that has been included in the above-mentioned meta-analysis of Castaneda and colleagues. It summarized the results of two Swedish cohort studies in patients with obesity attempting to lose weight by bariatric surgery versus conservative treatment (i.e., intensive lifestyle modification) compared to outcome data from nationwide health registers [44•]. The first study compared bariatric surgery patients ($n = 2010$; 1369 vertical-banded gastroplasty, 376 gastric banding, 265 gastric bypass) and patients with usual care ($n = 2037$; recruitment 1987–2001) from the Swedish Obese Subjects (SOS) study [45]. The second study compared patients from the Scandinavian Obesity Surgery Registry (SOReg; $n = 20{,}256$ gastric bypass patients) with individuals treated with intensive lifestyle modification ($n = 16{,}162$; intervention 2006–2013) [46]. The SOS study has a longer follow-up duration than any other existing study in the field of bariatric surgery, but used surgical techniques that are currently less frequently used. The SOReg study started in 2007 and provided shorter follow-up information, but used current surgical techniques and an intensively treated control group. In the SOS study, during 68,528 person-years (median 18; interquartile range 14–21), 9 suicides were observed in the surgery group and 3 suicides in the control groups (aHR 3.06, CI 0.79–11.9, $p = .107$) [44•]. In the SOReg study, there were 33 suicides in the surgery group and 5 suicides in the intensive lifestyle group (aHR 5.17, CI 1.86–14.4, $p = .0017$) during 149,582 person-years (median 3.9; interquartile range 2.8–5.2) [44•].

An investigation from the Toronto Bari-Psych Cohort study of adult bariatric surgery recipients ($n = 284$) examined the predictive value of the following variables for suicidal ideation, suicide attempts, and non-suicidal self-injury (NSSI) 1-year post-surgery: preoperative age, sex, relationship status, employment status, weight loss, self-reported depression and anxiety, diagnosis of MDD, past suicidal ideation, suicide attempts, NSSI, mental health treatment, and surgical complications [47•]. In the multivariate regression model, a history of suicidal ideation was the strongest predictor of suicidal ideation 1 year post-surgery ($p < .01$), followed by younger age ($p = 0.05$) [47•].

Taken together, these findings suggest it is important to emphasize the increased risk for suicide among postoperative patients—regardless of the low absolute numbers—and the need to identify those patients who are vulnerable to depression, suicide, and any other forms of deliberated self-harm. Possible risk factors for increased suicidal risk following surgery have been detailed by Mitchell and colleagues (2013). A combination of unfavorable medical, biological, genetic, and psychosocial factors may contribute to increased suicidality [23]. This includes new onset of depression or erosion of improvement in depressive symptoms given that the presence of a depressive disorder is one of the most consistently reported risk factors for suicide attempts and completed suicide [22, 48]. Postoperative alterations of the gastrointestinal tract may lead to pharmacokinetic changes and malabsorption of antidepressants or other drugs unless dosage adjustments are made [49]. Several studies indicated an increased risk for alcohol

problems due to malabsorption or a potential symptom shift (cross addiction hypothesis: from excessive eating to excessive drinking) after surgery that might be related to depressive symptoms, disinhibition, and suicide attempts [50, 51]. Other proposed reasons for postoperative depression and suicidality include neuroendocrine alterations and nutritional deficiency caused by malabsorption and/or non-normative eating behavior [37]. Moreover, disappointment from unrealistic expectations about surgical treatment, hanging skin, body image dissatisfaction, childhood maltreatment, perception of unsatisfactory social support, and unresolved familial, occupational, and other social conflicts may play a role [23, 28, 52, 53]. Last but not least, the continuing presence or reemergence of physical weight-related conditions, low health-related quality of life, restricted daily functioning, and reduced mobility may cause postoperative depression and an elevated risk for suicide [18, 23, 52].

Clinical Implications

Existing long-term findings regarding an elevated risk for the development or reoccurrence of depression and suicide in a subgroup of bariatric surgery recipients imply the need for special attention and monitoring of vulnerable patients. In the optimal case, bariatric teams should be multi-disciplinary, involving mental health professionals pre- and post-surgery. Presurgical group psychotherapy has been reported to reduce depressive symptoms, but the effect disappeared in the long run [54•]. Most existing postoperative behavioral management programs focus on weight loss and weight loss maintenance after surgery [55, 56]. There is a lack of interventions targeting postoperative mental health disorders. However, one controlled study aimed at reducing emotional eating and body dissatisfaction [57]. The Bariatric Surgery and Education (BaSE) study examined the efficacy of a videoconferencing-based psychoeducational group program following surgery in addition to conventional postoperative visits [58]. Patients with clinically relevant depression scores at baseline assigned to the BaSE program reported lower depression scores, better health-related quality of life, and a trend towards more weight loss compared to the control group [58]. To our knowledge, there is a paucity of studies investigating treatment for postoperative bariatric surgery patients suffering from depression.

Conclusion

Based upon current literature, it can be concluded that bariatric surgery patients (1) benefit from surgery with respect to weight loss and decrease in weight-related somatic disorders, (2) exhibit short- and medium-term improvements in depressive symptoms, but that (3) some patients are at-risk for new onset of depression and suicide. While research did not provide consistent evidence for a link between preoperative depression and postoperative weight loss, postoperative depression is assumed to be associated with lower weight loss, more concurrent psychopathology, and decreased quality of life [12, 19]. Prospective longitudinal examination of factors contributing to the increased risk for depression/suicide and the interaction between these factors is warranted [18, 23]. The inclusion of mental health professionals in bariatric teams would help to develop and evaluate appropriate, tailored interventions designed to attenuate depression, potential suicidal ideation, and other mental health disorders (e.g., eating disorders, addictive behaviors) for at-risk patients.

Compliance with Ethical Standards

Conflict of Interest Astrid Müller reports a grant from Institute Danone Ernährung für Gesundheit e.V. (2015/6) and personal fees from Johnson & Johnson Medical GmbH Ethicon Germany and German Federal Ministry of Education and Research. Carolin Hase and Melanie Pommnitz each declare no potential conflicts of interest. Martina de Zwaan reports a grant from NovoNordisk and personal fees from Cheplapharm, Weight Watchers, and NovoNordisk.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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