Does Bariatric Surgery Increase the Risk of Alcohol Use Disorders?

King WC, Chen JY, Mitchell JE, et al. Prevalence of alcohol use disorders before and after bariatric surgery. JAMA 2012;307:2516–25.

Study Overview

Objective. To determine whether there is a higher incidence of alcohol use disorder among patients after they undergo bariatric surgery.

Design. Prospective cohort study, pre-post design, with no control group.

Setting and participants. This study was part of a larger observational study of outcomes after bariatric surgery (Longitudinal Assessment of Bariatric Surgery-2, or LABS-2), in which adult patients planning to undergo bariatric surgery at 10 US medical centers were enrolled between February 2006 and 2009. 2458 patients enrolled and underwent 1 of 5 bariatric surgeries—Roux-en-Y gastric bypass (RYGB), laparoscopic gastric banding (LGB), sleeve gastrectomy, biliopancreatic diversion with duodenal switch, or banded gastric bypass. Patients were excluded from the trial if they had previously had any type of bariatric surgery, and excluded from this analysis if they did not complete a preoperative survey pertaining to their baseline alcohol use. In all, 1945 patients were included in this analysis.

Main outcome measures. The investigators were primarily interested in the development of alcohol use disorders (AUD) in patients undergoing surgery. To assess the presence of AUD in the 12 months before surgery, they used a previously validated 10-item screening questionnaire called the "Alcohol Use Disorder Identification Test" (AUDIT) on which respondents are scored on a 0–40 point scale, with higher point levels corresponding to worse degree of AUD. In this study, the investigators used a cutoff score of 8 points to signify the presence of AUD symptoms (Y/N), and also used previously validated subsets of items to indicate the presence of alcohol dependence or alcohol-related harm. The AUDIT test was done at baseline and again at 1 and 2 years postoperatively, though not all patients completed all 3 assessments (only 1400 of 1945).

In addition to the surgical procedures themselves, the investigators were interested in looking at other predictors of risk for AUD such as age, gender, and comorbid mental illness. They included a covariate for BMI based on anthropometric measures taken preoperatively. All other covariates were based on self report and included patient age, gender, race/ethnicity, marital

status, employment status and income, perceived level of social support, physical and mental health (using SF-36), depressive symptoms (using Beck depression scale), drug use, eating disorders, and presence of other psychiatric illness.

To compare percentages in categorical variables across exposure categories, chi-square testing was used, and for continuous variables, Wilcoxon rank-sum testing was used. The investigators built generalized linear models to predict the presence of AUD at 1 and 2 years postoperatively based on the above variables and, additionally, surgical type and postoperative weight loss. Models were created separately for pre and postoperative characteristics, with backward and forward selection as well as testing for interaction amongst all variables.

Additionally, to address the potential bias introduced by incomplete follow-up or failure to respond to the survey (many participants completed only 1 of the 2 follow-up surveys, and 514 additional surgical patients were excluded for not completing the baseline survey), the investigators compared these groups on the basis of other known risk factors for AUD.

Results. Of the 1945 patients included in this analysis, 21.2% were male and 87% were white, consistent with previous studies of bariatric surgery. The median age was 47 years, and 64% of participants were married. There was a fairly even spread across educational levels, with 23% having a high school education or less, 39.7% reporting some college, and 37.3% with a college degree or higher. 18% of patients reported having a household income of $25K or less, and 17% reported $100K or higher. Median baseline BMI was 45.8 kg/m^2, corresponding to a diagnosis of morbid obesity. Reported baseline levels of social support were high. Over half (57.4%) of patients reported undergoing treatment for emotional or psychiatric problems in the past year, and 16% reported binge eating. Very few (2.2%) were current smokers, and 4.3% reported recreational drug use. Using the baseline AUDIT questions, 7% reported alcohol consumption 2 or more times per week and 7.8% met the cutoff to be classified as having an AUD. In terms of surgical procedures, most of the patients underwent RYGB (69.9%) or LGB (25.2%), with the other 3 procedures accounting for the remaining 4.9%.

Patients who were excluded based on failure to complete the baseline AUDIT questionnaire were found to be younger and more likely to be of non-white race as well as smokers than those included in this analysis.

The vast majority of patients reported drinking no alcohol (41.3%) or only drinking less than once per month (37.4%) at the baseline survey. Additionally, in terms of the number of drinks consumed in an average drinking episode, there was a significant ($P < 0.001$) decrease from preop to postop year 1, with the percent of participants reporting zero drinks increasing from 41% to 45%, and those reporting 3 or more drinks per drinking episode decreasing from 13.3% to 9.9%.

Compared with frequency of preop alcohol use, there was not a significant increase in regular use during postoperative year 1 (21.3% used alcohol 2 or more times per month at baseline, compared with 22.7% during year 1, $P = 0.89$), but there was a significant jump both from postop year 1 to 2 (22.7% using alcohol 2 or more times per month, vs 29% in year 2, $P < 0.001$), and from the preoperative year compared with postop year 2 ($P < 0.001$).

In patients who reported baseline alcohol dependence symptoms, the fraction did not change appreciably from before surgery to postop year 1 (2.8% to 3.2%, $P = 0.44$), but did increase significantly between postop years 1 and 2 (3.2% to 5.5%, $P < 0.01$), and when postop year 2 was compared with baseline ($P < 0.001$). A similar pattern was observed for the categorization of AUD, alcohol-related harm, and rates of AUDIT scores ≥ 8. Despite this pattern of increasing symptomatology of AUD by postop year 2, the percentage of patients who engaged in alcohol consumption at "hazardous levels" actually decreased over time (19.9% preop, 13.3% postop yr 1, 16.5% postop year 2, $P < 0.001$ for postop year 2 vs preop). There were also no significant changes in the number of patients treated for AUD from year to year.

In multivariable models, male sex, younger age, smoking, recreational drug use, lower levels of social support, and preop regular alcohol use or AUD were all independent predictors of postop development of AUD. The only significant interaction between variables noted by the investigators was that increasing age increased the magnitude of the pre-post AUD relationship.

Surgical type was also a very important predictor of developing AUD, in particular, for patients with RYGB. Relative to gastric banding, patients undergoing RYGB had an odds ratio of 2.1 (95% confidence interval 1.4–3.1) for developing AUD after surgery. Because

of this, the investigators performed additional multivariable analyses stratified by surgical type. Among bypass patients, number of drinks per episode dropped from the baseline period to postop year 1 and then didn't change significantly from year 1 to 2. However, despite this drop in number of drinks, the prevalence of AUD actually increased significantly after surgery ($P < 0.001$). This somewhat paradoxical relationship was not observed in banding patients, who neither drank fewer drinks per episode after surgery, nor had an increase in AUD prevalence postoperatively ($P = 0.24$).

Conclusion. Based on the results of this prospective observational study, the investigators conclude that these bariatric surgical patients overall, and RYGB patients in particular, were more likely to have AUD postoperatively than preoperatively.

Commentary

Compared with interventions such as behavior change and pharmaceuticals, bariatric surgery is the most effective treatment for obesity, with patients often achieving excess weight loss of up to 30% to 50%, depending on surgery type [1]. As a result of this enormous effect, and the resulting improvement in comorbidities such as diabetes, hyperlipidemia, and sleep apnea, these surgeries are now being made available to more patients, including adolescents and adults with lesser degrees of obesity than were traditionally required for surgical intervention [2]. Although many providers are aware of the amazing results possible through bariatric surgery, only about 1% of eligible patients undergo the procedures [3]. Reasons for this low uptake likely include lack of access to surgical centers and lack of insurance coverage, but also fear of what is an invasive and in some cases permanent procedure. Despite its profound benefits, there are many potential complications of bariatric surgery. These include anastamotic leaks, ulcers, obstructions, and other issues directly related to the change in anatomy required for the weight loss and diabetes resolution to occur [1]. In addition to purely anatomic considerations, however, there is growing concern about other types of complications that could result from altering the digestive and absorptive pathway, including micronutrient deficiencies and behavioral diseases such as alcoholism [4].

Data on changes in alcohol use after bariatric surgery is sparse, but given that there have been calls to provide the surgery to more and younger patients, it will be important to understand all of the potential risks of the surgery in these groups. In this prospective study of a large group of bariatric surgical patients in the United States, the investigators found that risk of AUD did, in fact, increase after surgery, particularly among RYGB patients. Strengths of this study include its prospective nature, which was novel compared to existing studies on this topic, and the fact that it took place at multiple locations across the United States on a relatively diverse patient population from many different educational and income-level backgrounds. Furthermore, compared to many studies of surgical patients, the investigators were able to follow patients for 2 years after surgery, which was important for the outcome of interest in this analysis.

As it is framed, however, the authors of this study are essentially doing a pre-post comparison of bariatric surgical patients with no control group, or "counterfactual." In other words, what might have happened to these same people had they not undergone surgery? Perhaps one way to address this would have been to compare the rate of AUD onset among bariatric surgery patients to that in a surgery-eligible group that did not have procedures, thus determining the attributable risk to bariatric surgery itself, rather than the overall risk of AUD happening in this type of patient.

On a related note, despite the large overall sample size in the study, the investigators' hypothesis is mainly of interest in RYGB patients. The authors state that previous research on RYGB patients shows that, with just 1 drink, post-bypass patients report more euphoria [5] and that their blood alcohol levels rise higher and stay up for longer than if they had consumed the same amount of alcohol preoperatively [6]. It is this kind of pattern that is believed to lead to AUD and dependence, and in theory this same pattern may not be observed in other surgical types, especially in gastric banding. Perhaps they could have framed the primary analysis as a comparison between RYGB patients and LGB patients in order to strengthen their design. Near the end of their results section, they do make this direct comparison, stratifying by surgical type to compare risk of AUD in band vs bypass, and do, indeed, conclude differential risk between these 2 groups.

Another potential limitation of this study is that relying on a baseline self-report measure in patients preparing to undergo bariatric surgery may yield an in-

accurate estimate of preoperative alcohol use. Bariatric surgery is only covered in patients who have undergone rigorous behavioral and psychological preparation, and perhaps these patients would be less likely to admit to alcohol use out of fear that such an admission could lead to them not getting surgery. The authors partially address this by providing assurance to patients that their information will be kept anonymous, but in some cases this might not be sufficient reassurance to expect complete honesty from patients. Additionally, given that preop patients are in an "auditioning" phase and likely to be on their best behavior with respect to diet and lifestyle changes in the months leading up to surgery, perhaps taking a retrospective measure of their alcohol use behavior prior to considering surgery would have been more representative of their true behavior patterns. As it stands, if patients did underreport alcohol use at baseline, it could have led to a false-positive finding of increased AUD after bariatric surgery.

One important caveat noted by the authors in their discussion section is that their classification of AUD is more stringent than that in the DSM-IV and therefore may also be over-reporting the rate of patients who would otherwise not be diagnosed with such disorders.

Furthermore, it could be that the nonrespondents excluded from this analysis were at even higher risk of baseline and subsequent AUD than those included in the study. The authors do try to address this question by analyzing the baseline covariates of nonresponders compared with those included, and find that younger smokers were more likely not to complete the initial AUDIT questionnaire. Given that younger age and smoking were both independent risk factors for developing postoperative AUD, this raises the concern that the findings here could actually be underestimating the true risk of AUD after surgery.

Applications for Clinical Practice

This large prospective study of AUD before and after bariatric surgery was the first of its kind, and found that patients were at greater risk of developing AUD after surgery, especially if they had undergone RYGB. This finding is supported by a physiologic mechanism, and should remind clinicians caring for bariatric surgery patients to screen for and counsel patients about AUD both before and after surgery, and to repeat the screening and education beyond the first postoperative year. It is unclear, however, whether this practice needs to go above and beyond the screening and counseling that should be conducted in routine practice for all patients—tasks that, themselves, are often underperformed by busy primary care providers.

—Kristina Lewis, MD, MPH

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