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Smoking and alcohol use in gastric bypass patients

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Contributors

All authors have contributed to and approved the final manuscript. Specific contributions include:

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- Melissa A. Napolitano – Edited the manuscript, designed the study
- G. Craig Wood – Managed study data, analyzed data, edited the manuscript, designed the study, wrote the protocol
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Conflict of Interest

- Michelle R. Lent – No conflict of interest
- Sharon Hayes – No conflict of interest
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Abstract

Bariatric surgery may increase the risk of substance use. The purpose of this study was to prospectively assess smoking and alcohol use before and after bariatric surgery, identify characteristics associated with alcohol use and smoking, and examine substance use and weight loss. Participants (N=155, Mean=50.1±11.3 y and 45.7±7.0 kg/m^2) were Roux-En-Y gastric bypass (RYGB) patients that completed surveys on substance use preoperatively and postoperatively. Alcohol use significantly decreased preoperatively (72.3%) to postoperatively (63.2%). As preoperative alcohol quantity rose, the odds of consuming any alcohol postoperatively increased six-fold. Higher BMI increased the odds of high alcohol consumption. Older age decreased the odds of alcohol use and smoking. Smoking status did not differ pre- (19.4%) to post- (14.8%) surgery. Alcohol use and smoking were not associated with weight loss. After weight-loss surgery, alcohol use declined but smoking rates did not significantly change. Younger patients are more likely to use alcohol and smoke postoperatively. Patients with a higher BMI or a history of substance use may be more likely to use alcohol postoperatively.

Keywords

Bariatric surgery; substance use; preoperative risk factors

1.1 Introduction

Bariatric surgery is the most effective treatment for extreme obesity (Buchwald et al., 2004; Buchwald et al., 2009), but it may increase the risk of some unhealthy behaviors such as substance use (Adams, Gabriele, & Baillie, 2012; Conason A, 2012; King et al., 2012). Greater socialization postoperatively or substituting substances in lieu of food to satisfy "addictive" tendencies may contribute to increases in substance use after surgery (Buffington, 2007; Heinberg & Ashton, 2010; Lent & Swencionis, 2012). Most studies of substance use following bariatric surgery are limited by small samples (Adams, et al., 2012; Conason A, 2012) and retrospective designs (Ertelt et al., 2008; Suzuki, Haimovici, & Chang, 2012).

The 2013 American Society for Metabolic and Bariatric Surgery (ASMBS) guidelines recommend that "high risk" patients (i.e., a history of substance abuse, regular alcohol use before surgery, smokers, or RYGB patients) abstain from alcohol use after gastric bypass given the altered metabolism of alcohol and potential for alcohol use disorders after surgery (Mechanick et al., 2013). Further, alcohol use after surgery may relate to weight regain (Odom et al., 2010) and vitamin deficiencies (Hagedorn, Encarnacion, Brat, & Morton, 2007). To the best of our knowledge, there are only two prospective studies of alcohol use in bariatric surgery populations (Conason A, 2012; King, et al., 2012). The first study suggested that alcohol use disorders (AUD) increase by 2% at two years postoperatively (King, et al., 2012), but did not find a relationship between AUDs and weight loss outcomes. Male gender, younger age, lower social support, smoking and alcohol consumption preoperatively, and undergoing RYGB (versus other bariatric surgeries) were associated with AUDs postoperatively (King, et al., 2012). The second study found that while rates of any alcohol use remained consistent pre (61.3%) to post-surgery (63.2%) in RYGB and gastric banding patents, the frequency of alcohol use increased in RYGB patients only (Conason A, 2012).

Given the potential for wound complications (Sorensen et al., 2005), ASMBS guidelines (Mechanick et al., 2008; Mechanick et al., 2013) recommend smoking cessation for patients. A prospective study on smoking indicated that rates do not notably change pre (10.4%) to post-surgery (8.1%) (Conason A, 2012). Data regarding predictors of smoking after surgery and weight loss are largely retrospective (Adams, et al., 2012).

The purpose of this study was to: 1) prospectively assess smoking and alcohol use before and after RGYB; 2) identify preoperative characteristics that were associated with postoperative alcohol use and smoking; and 3) examine the relationship between smoking, alcohol use and weight loss.

2.1 Materials and Methods

2.1.1. Participants

Participants were 899 RYGB patients recruited from a large rural health system. Identical surveys were administered during a 6-12 month preoperative preparation program and postoperatively (≥ 365 days) via mail, and were not anonymous. Among the 899 persons who completed the survey preoperatively, 345 (38%) completed the survey postoperatively (mean 34.9±12.8 months). Of the surveys returned, 155 answered at least one question on recent alcohol use and current smoking both pre and postoperatively (17.2%) and were included in analyses.

Participants provided written informed consent for a larger longitudinal study of outcomes in bariatric surgery (Wood et al., 2012). The study protocol was approved by Geisinger Medical Center's Institutional Review Board.

2.1.3. Demographics

Data that was extracted from medical records included gender, surgical BMI, surgery date, race/ethnicity, and age.

2.1.4. Alcohol use

A questionnaire on alcohol use was created by study investigators (Table 1). A drink was defined as "a can or bottle of beer, glass of wine, wine cooler, cocktail or shot of hard liquor." National Institute for Alcohol Abuse and Alcoholism (NIAAA) criteria (Helping Patients Who Drink Too Much: A Clinician's Guide, 2005) suggest a maximum of three drinks/day for women and four drinks/day for men. Therefore, we categorized alcohol use as: 1) None, 2) "low" consumption (1-4), and 3) "high" (≥ 5) consumption on typical drinking occasions. Alcohol quantity was also transformed to continuous scales (e.g., 1-2 drinks = 1, 3-4 drinks = 2).

2.1.5. Smoking

Current smoking was evaluated dichotomously (no/yes).

2.1.6. Weight

Percent excess weight loss nadir (%EWL nadir) was defined as the maximum weight loss achieved (≥6 months) postoperatively based on a minimum of three weight measurements. Ninety patients had at least three weight measurements.

2.1.7. Theory/calculation

Logistic or linear regression models examined preoperative and demographic variables (age, gender, smoking, alcohol use, and surgical BMI) in relation to postoperative alcohol use

dichotomously (none/≥1; "high" [5+]/"low" [1-4 drinks]) or continuously, current smoking (yes/no) and %EWL nadir. McNemar's or Wilcoxon's signed rank repeated measures tests determined changes in substance use. Mann Whitney tests examined absolute alcohol use and %EWL nadir. Significance levels were $p<0.05$ and analyses conducted using SPSS 19.0 (IBM; Chicago).

3.1 Results

3.1.1. Participants

A high proportion of participants were female (80.6%) and Caucasian (98.1%), with a mean age of 50.1±11.3 y and BMI of 45.7±7.0 kg/m^2 at the time of surgery. Participants not included in analyses displayed similar characteristics (age=46.9±11.1 y, BMI=47.3±8.1 kg/m^2, 98.2% Caucasian, 81.0% female).

3.1.2. Alcohol Use

Alcohol use significantly decreased from the preoperative (72.3%) to the postoperative (63.2%) period (p=.026, Table 2). The percentage of "high" consumers decreased and "low" consumers increased after surgery, but not significantly (p=0.065). Of the 43 of participants who did not use alcohol one year before surgery, 10 (23.2%) used alcohol use after surgery. Of the 112 participants who used alcohol in the year before surgery, 24 (21.4%) ceased use after surgery.

As preoperative alcohol quantity rose, the odds of consuming any alcohol postoperatively increased 6.4 fold (EXP[B]=6.36, 95% CI [3.09-13.08], p<.001]). Older age decreased the odds of any alcohol use (none/≥1) postoperatively (EXP[B]=.954, 95% CI [.919-.990], p=.013). Higher preoperative BMI increased the odds of high alcohol consumption after surgery (EXP[B]=1.23, 95% CI [1.05-1.44], p=.01).

3.1.3. Smoking

Smoking status did not differ pre- (19.4%) to post- (14.8%) surgery (p=.28). Among preoperative smokers (n=30), 63.3% stopped after surgery. Among nonsmokers before surgery (n=125), 9.6% reported smoking after surgery. Preoperative smokers reported smoking 13.7±7.3 cigarettes/day, while postoperative smokers (n=23) reported 12.8±8.1 cigarettes/day. Among the preoperative factors examined, only older age decreased the odds of smoking after surgery (EXP[B]=.897, 95% CI [.838-.959], p=.002).

3.1.4. Weight Loss

Regression analyses indicated that surgical BMI (β=-.44, p<.001) significantly contributed to the variance in %EWL nadir and was controlled for in analyses. Median %EWL nadir was 74.6%. Quantity of alcohol use before or after surgery did not significantly contribute to the variance in %EWL nadir (p=.78 and p=.46, respectively). Median %EWL nadir did not differ in alcohol users before surgery (74.3%) and nonusers (77.9%, p=.87), or after surgery, (users=71.2% and nonusers=81.5%), p=.18). Smoking status was not related to %EWL before (p=.93) or after (p=.17) surgery.

4.1. Discussion

There were four principal findings of this study. First, the number of patients reporting any alcohol use declined significantly by 9.1% postoperatively (72.3% to 63.2%). King and colleagues' (King, et al., 2012) primary outcome was change in AUD after two years, but they also reported rates of any alcohol use. Despite the 2% rise in AUD prevalence, King et al. (King, et al., 2012) found the rates of any alcohol use to remain constant before (58.7%)

and two years after (58.6%) surgery. The discrepancy between our findings and those of King et al. (King, et al., 2012) may be related to their utilization of a validated assessment of alcohol use (The Alcohol Use Disorders Identification Test). Of the 155 participants, we found 54.8% typically consumed 1-4 drinks after surgery, similar to previous findings (King, et al., 2012). Despite the overall reduction in alcohol use, 23% of the patients who did not use alcohol before surgery reported using alcohol after surgery. While alcohol use after surgery does not mean that a patient is dependent on alcohol, better understanding of mechanisms underlying the initiation or reintroduction of alcohol use is needed.

Second, several baseline factors were associated with alcohol use postoperatively. The strongest factor was quantity of alcohol use before surgery, with the odds of any alcohol use increasing 6-fold as preoperative alcohol use increased. No data are available for comparison regarding baseline factors and any alcohol use, but our findings are similar to those of King, et al., who found that younger age and regular preoperative alcohol use were associated with AUDs postoperatively (King, et al., 2012). Higher BMI modestly increased the odds of “high” consumption of alcohol postoperatively. We did not find any gender effects, but our small sample of males may have precluded any gender-related findings. Patients who are younger, have a higher BMI, or use alcohol before surgery may benefit from monitoring of alcohol use postoperatively.

Third, smoking rates decreased postoperatively (from 14.8% to 19.4%), but not at statistically significant levels, as previously reported by others (Conason A, 2012). Younger age was associated with a higher risk of smoking. Despite recommendations to remain abstinent, nearly 15% reported smoking after surgery. Overall, we found a relatively high rate of smoking cessation (63%) following RYGB surgery and a corresponding high rate of smoking initiation (10%). Continuous assessment of smoking in younger patients may be warranted.

Fourth, alcohol use and smoking were not associated with weight loss. A previous prospective study (King, et al., 2012) also did not find alcohol use to relate to weight loss. Several retrospective studies suggested a history of substance abuse to be associated with better weight loss following surgery (Clark et al., 2003; Heinberg & Ashton, 2010). However, Odom and colleagues (Odom, et al., 2010) found weight regain (>15%) when “others expressed concern” over patients’ substance use after surgery. We did not examine weight regain, which is an important area to investigate in future longitudinal studies.

Our study has several limitations. We did not assess clinical criteria for AUDs. Despite the overall decline in alcohol use, it is possible that the rates of AUD in our sample changed. Data were subject to self-report and response bias, and the sample were mostly female (81%) and Caucasian (98%). Interpretation of these findings is also limited by the use of a data collection instrument for substance use that has not yet been fully validated and by a relatively low response rate. Therefore, the results may not be representative of the nationwide RYGB population. Further, due to social desirability, individuals who use alcohol or smoke postoperatively may be less likely to complete surveys. Subsequent examinations utilizing objective measures (i.e., urine and cotinine screens), and established self-report measures of alcohol and other addictive behaviors (i.e., prescription drugs, gambling), should provide greater insight into substance use following RYGB (Heinberg & Ashton, 2010; Heinberg, Ashton, & Coughlin, 2012; Sogg, 2007). High-risk patients may benefit from substance use awareness programs (Heinberg, et al., 2012).

In conclusion, the rate of alcohol use declines, while smoking rates do not significantly change, following RYGB surgery. Patients of younger age, higher BMI, or with a history of substance use may be more likely to use alcohol after surgery. Younger patients may also be

more likely to smoke postoperatively. Greater understanding of factors underlying substance use after RYGB may help healthcare professionals to better identify at-risk patients.

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Highlights

1. Gastric bypass patients completed surveys on substance use.
2. Alcohol use decreased after weight-loss surgery.
3. Smoking rates did not significantly change after weight-loss surgery.
4. Older age decreased the odds of alcohol use and smoking after weight-loss surgery.
5. Alcohol use and smoking were not associated with post-operative weight loss.

Table 1

Alcohol use and smoking questionnaire

Questions
Have you smoked at least 100 cigarettes (or 5 packs of cigarettes) in your entire life?
Do you smoke now?
On average, how many cigarettes do you smoke per day?
For approximately how many years have you smoked this amount?
If you smoked in the past, on average how many cigarettes did you smoke per day?
For approximately how many years did you smoke this amount?
How often did you have a drink containing alcohol in the past year?
How many drinks did you have on a typical day when you were drinking in the past year?
How often did you have 6 or more drinks on occasion in the past year?

Table 2

Smoking and alcohol use before and after gastric bypass surgery (N=155)

	Pre-operative				Post-operative (≥ 365 days)				
	N	**%**	**Mean**	**SD**	**N**	**%**	**Mean**	**SD**	**Change**
Currently Smoke									
No	125	80.6			132	85.2			
									p=.28
Yes	30	19.4			23	14.8			
Cigarettes per day			13.7	7.3			12.8	8.1	*p*=.67
Alcohol use in the past year									
No	43	27.7			57	36.8			
									p=.026 *
Yes	112	72.3			98	63.2			
“Low” 1-4 drinks typically	90	58.0			85	54.8			
									p=.065
“High” ≥5 drinks typically	12	7.7			5	3.2			
Not reported	10	6.4			8	5.1			
Monthly or less	78	50.3			60	38.7			
2-4 times a month									
	22	14.2			27	17.4			
2-3 times a week									
	10	6.5			5	3.2			
4-5 times a week									
	2	1.3			5	3.2			
> 5 times a week	0	0			1	0.6			

* Significant at p<.05