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Changes in Marital Status Following Roux-en-Y Gastric Bypass and Sleeve Gastrectomy: A US Multicenter Prospective Cohort Study

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Abstract: Among a US cohort followed 5 years after Roux-en-Y gastric bypass or sleeve gastrectomy, cumulative incidence of marriage and separation/divorce were 18% among unmarried (N=614) and 13% among married (N=827) participants, respectively. Preoperative predictors of marriage included younger age, college degree, lower BMI and cohabitating or being separated (versus single).

Objectives: To describe changes in marital status following Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy (SG).

Background: Spousal encouragement and finding a life partner are self-reported motivators for undergoing bariatric surgery.

Methods: This study included 1441 US adults enrolled in a 6-center prospective cohort study who underwent RYGB or SG (2006–2009) and self-reported marital status preoperatively and annually postoperatively for ≤5 years. Time to change in marital status was analyzed with Kaplan–Meier estimates of cumulative incidence and Cox proportional-hazard models.

Results: Preoperative, 57% of participants (79% female, median age 47 years, median body mass index [BMI] 47 kg/m^2) were married, 5% cohabitating, 4% separated, 15% divorced, 2% widowed, and 17% always single. The 5-year cumulative incidence of marriage among unmarried participants (N = 614) was 18%. Cohabitating (hazard ratios [HR] = 5.25) or being separated (HR = 3.03) versus always single, younger age (HR = 1.69/10 years), having a college degree versus ≤high school (HR = 2.36), lower BMI (HR = 1.54/10kg/m^2), and fewer depressive symptoms (HR = 1.47/10 Beck Depression Inventory points) preoperative independently predicted ($P < 0.05$) higher chance of marriage. The 5-year cumulative incidence of separation/divorce among married participants (N = 827) was 13%. Female sex (HR = 2.08), younger age (HR = 1.84/10 years), household income <$25,000 versus ≥$100,000 (HR = 2.48), smoking (HR = 1.76), and sexual desire ≥once/week versus never (HR = 2.12) preoperative independently predicted ($P \leq 0.05$) separation/divorce.

Conclusions: Among a cohort of US adults, the majority did not change marital status within 5 years following RYGB or SG. Cumulative incidence of marriage and separation/divorce was 18% among unmarried and 13% among married participants, respectively. Several preoperative predictors of marriage and separation/divorce were identified.

Keywords: bariatric surgery, divorce, marriage, relationship, Roux-en-Y gastric bypass, sleeve gastrectomy

INTRODUCTION

Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG) are the most effective treatments for severe obesity and generally lead to sustainable improvements in weight, glycemic control, and other aspects of physical health.[1–4] Bariatric surgical procedures are also associated with improvements in mental health,[5,6] self-esteem,[7,8] body image,[9,10] sexual desire,[11] and comfort with physical intimacy.[7]

While weight loss and improving physical health are the top motivators for bariatric surgery, preoperative patients also report motivators related to romantic relationships, such as encouragement from partners to undergo surgery, improving intimacy, and finding a life partner.[8,12–14] Qualitative studies examining how bariatric surgery impacts interpersonal relationships note both improvements and declines in existing relationships,[15,16] as well as increased romantic interest from others.[17,18] However, there is a dearth of research quantifying changes in relationship or marital status, or examining factors related to changes in relationship or marital status. Two large cohort studies from Scandinavia are exceptions.[19,20] A study from Denmark found that compared to a nonsurgical reference group, those who were single at the time of bariatric surgery (2005–2013) had an increased chance of an incident relationship, and those who were in a relationship at surgery had an increased chance of becoming single across follow-up (median = 8 years).[19] Likewise, a Swedish study found that compared to a nonsurgical reference group, those who were not married at the time of gastric bypass surgery (2007–2012) had an increased chance of getting married, and those who were married at surgery had an increased chance of divorce across 6 years of follow-up.[20]

This report addresses knowledge gaps in the bariatric surgery literature by describing stability and changes in marital status in the first 5 years following RYGB or SG among a large US adult cohort. In addition, we evaluate a large number of sociodemographic, physical health, and mental health measures as predictors and correlates of postoperative marriage and separation or divorce.

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METHODS

Data Source

The Longitudinal Assessment of Bariatric Surgery-2 (LABS-2) study was a prospective cohort study of adults at least 18 years old undergoing their first bariatric surgical procedure between March 2006 and April 2009 performed by a participating surgeon at 1 of 10 hospitals from 6 clinical centers in the United States.[21] The institutional review board at each center approved the protocol,[22] and participants gave written informed consent. The study is registered at ClinicalTrials.gov (NCT00465829).

Standardized research assessments were conducted independent of clinical care, within 30 days preoperative, at 6 months, and 1 year postoperative and then annually (±0.5 years) for 6 or 7 years through January 2015. Most measures, including marital status, were collected at all assessments except the 6-month and 6-year assessments, which were brief and intended to be completed by telephone or mail. This report is limited to data collected up to the 5-year assessment, which could occur up to 5.5 years postoperative.

Inclusion Criteria

Of 2458 LABS-2 participants, 1829 underwent RYGB or SG. Among these potential participants, 388 (21%) were excluded due to not reporting marital status preoperatively and postoperatively by the 2-year assessment. Among the analysis sample (N = 1441), data were censored before 2 or more consecutive missed assessments during follow-up to minimize the impact of missing data.

Outcome Assessment

Current marital status was self-reported as: married, living as married, separated/living as married but no longer living as married, divorced, widowed, or never married/never lived as married. For simplicity, the terms 'cohabitating' for living as married, 'separated' for separated/living as married but no longer living as married, and 'always single' for never married/never lived as married, are used for the remainder of this report. While all changes in marital status were of interest, the 2 primary outcomes were marriage and separation or divorce.

Covariates

Preoperative factors that might influence change in marital status were selected[19,20,23–26]: marital status, sex, age, race/ethnicity, education level, employment status, household income, past-year smoking status, body mass index (BMI), history of cardiovascular disease, diabetes, severe walking limitation, Short Form-36 item (SF-36) physical component summary and mental component summary scores, Beck Depression Inventory (BDI) score, alcohol problem, eating disorder (binge eating, loss of control eating, or neither), psychiatric medication use, Interpersonal Support Evaluation List (ISEL) belonging score, frequency of sexual desire, sexual activity in the past month and satisfaction with sexual life. All covariates are described in Supplemental Methods, http://links.lww.com/AOSO/A135.

Statistical Analysis

Analyses were performed in SAS 9.4 (SAS Institute Inc, Cary, NC). All reported *P* values are 2-sided and are reported to guide the interpretation of findings.[27] Preoperative characteristics of the analysis sample versus LABS-2 participants who were excluded due to missing data were compared using the Pearson χ^2 test for categorical variables, the Cochran–Armitage test for ordinal variables, and the Wilcoxon rank-sum test for continuous variables. Preoperative characteristics of the analysis sample are reported with descriptive statistics by marital status.

The surgery date and date of follow-up assessments were used to calculate follow-up time, which was censored when a participant was no longer eligible to have the outcome. Time to change in marital status (and specifically to cohabitating, married, cohabitating/married, separated, divorced, and separated/divorced) was analyzed with Kaplan–Meier estimates of cumulative incidence by applicable preoperative marital status groups. Because participants reported current marital status at each assessment, the date of change was estimated as the average time between the assessment at which a new marital status was reported and the previous assessment.

Among participants who were not married preoperative (N = 614), Cox proportional-hazard models were used to identify preoperative variables (listed above under "covariates") associated with the chance of incident marriage. Factors with $P < 0.20$ were entered into a single multivariable model with the clinical site (which was forced; ie, included regardless of *P*) and retained via backward elimination if $P < 0.10$. Then interactions between preoperative marital status and the other variables in the multivariable model were tested and retained if $P < 0.10$. Unadjusted and adjusted hazard ratios (HR and aHR, respectively), 95% CI, and *P*-values are reported; for continuous variables, HR is reported per 10 units.

A multivariable Poisson mixed model with robust error variance[28] was used to determine whether 16 pre-to-postoperative changes were related to being married postoperative; all change variables (described in the Supplemental Methods http://links.lww.com/AOSO/A135) and the outcome (married) were entered as repeated measures (1-year through 5-year assessments). Change variables, preoperative variables, clinical site, and surgical procedure were entered in a single multivariable model. Preoperative variables retained in the Cox proportional-hazard multivariable model (ie, marital status, age, education, BMI, and BDI score), site, and surgical procedure were forced. Change variables and their preoperative counterpart (eg, change in household income and preoperative household income) were retained via backward elimination if $P < 0.10$ for the change variable. The adjusted relative risk (aRR), 95% CI, and *P*-values of change variables are reported; for continuous variables, aRR is reported per 10 units.

The analyses described above were repeated with the outcome separation or divorce among participants who were married at the preoperative assessment (N = 827).

RESULTS

Participant Characteristics

LABS-2 participants who were excluded (N = 388) versus included in the analysis sample (N = 1441) were younger (median age 41 versus 47 years; $P < 0.001$), a lower percentage were non-Hispanic White (76% versus 83%; $P = 0.02$), and a higher proportion smoked in the past year (21% versus 13%; $P < 0.001$). Otherwise, the groups were similar ($P \geq 0.10$ for 18 variables; Supplemental Table 1, http://links.lww.com/AOSO/A135).

Preoperative characteristics of the analysis sample are shown in Table 1 (demographics) and Supplemental Table 2, http://links.lww.com/AOSO/A135 (health status) overall and by preoperative marital status. The majority of participants were female (79%) and married (57%). Age ranged from 19–75 years, BMI from 34 to 94 kg/m^2 (median = 46.5 kg/m^2).

Change in Marital Status

After censoring follow-up before 2 or more consecutive missed follow-up assessments (affecting 366 of 1441 participants), the median (IQR) follow-up was 4.9 (3.4–5.0) years. The cumulative incidence of change in marital status is shown overall in Fig. 1A, and by preoperative marital status in Fig 1B. The

TABLE 1.

Participant demographics at time of RYGB or SG, overall and by marital status

	Total	Married	Cohabitating	Separated	Divorced	Widowed	Always single
	N = 1441	n = 827	n = 68	n = 57	n = 213	n = 33	n = 243
Female	1143 (79.3%)	632 (76.4%)	57 (83.8%)	47 (82.5%)	180 (84.5%)	32 (97.0%)	195 (80.2%)
Age, years							
Median (25th:75th)	47 (38:55)	48 (39:55)	44 (39:52)	45 (39:52)	50 (44:56)	56 (52:61)	35 (28:45)
Range	19:75	21:75	24:63	26:63	21:73	27:73	19:70
Race/ethnicity	n = 1424	n = 817	n = 66		n = 209		n = 242
Non-Hispanic White	1184 (83.1%)	715 (87.5%)	54 (81.8%)	39 (68.4%)	167 (79.9%)	27 (81.8%)	182 (75.2%)
Non-Hispanic Black	143 (10.0%)	53 (6.5%)	6 (9.1%)	13 (22.8%)	27 (12.9%)	5 (15.2%)	39 (16.1%)
Hispanic	53 (3.7%)	29 (3.5%)	3 (4.5%)	4 (7.0%)	5 (2.4%)	0 (0.0%)	12 (5.0%)
Other	44 (3.1%)	20 (2.4%)	3 (4.5%)	1 (1.8%)	10 (4.8%)	1 (3.0%)	9 (3.7%)
Education	n = 1440						n = 242
High school or less	340 (23.6%)	200 (24.2%)	16 (23.5%)	17 (29.8%)	52 (24.4%)	6 (18.2%)	49 (20.2%)
Some college/post high school education	604 (41.9%)	341 (41.2%)	28 (41.2%)	23 (40.4%)	91 (42.7%)	17 (51.5%)	104 (43.0%)
College degree or higher	496 (34.4%)	286 (34.6%)	24 (35.3%)	17 (29.8%)	70 (32.9%)	10 (30.3%)	89 (36.8%)
Employed for pay	979/1433 (68.3%)	592/824 (71.8%)	43/67 (64.2%)	28 (49.1%)	128/212 (60.4%)	14 (42.4%)	174/240 (72.5%)
Household income	n = 1403	n = 805	n = 66	n = 56	n = 210	n = 30	n = 236
<$25,000	281 (20.0%)	57 (7.1%)	18 (27.3%)	34 (60.7%)	92 (43.8%)	8 (26.7%)	72 (30.5%)
$25,000–$49,999	392 (27.9%)	189 (23.5%)	17 (25.8%)	19 (33.9%)	62 (29.5%)	12 (40.0%)	93 (39.4%)
$50,000–$74,999	317 (22.6%)	219 (27.2%)	14 (21.2%)	0 (0.0%)	36 (17.1%)	4 (13.3%)	44 (18.6%)
$75,000–$99,999	214 (15.3%)	178 (22.1%)	8 (12.1%)	2 (3.6%)	11 (5.2%)	1 (3.3%)	14 (5.9%)
≥$100,000	199 (14.2%)	162 (20.1%)	9 (13.6%)	1 (1.8%)	9 (4.3%)	5 (16.7%)	13 (5.5%)

RYGB, Roux-en-Y Gastric Bypass; SG, Sleeve Gastrectomy.

number at risk and number of events by year after surgery are reported in Table 2. The cumulative incidence of change in marital status at 2 and 5 years was 17% and 27%, respectively, but varied greatly by preoperative marital status. By year 4, 83% of participants who were cohabitating and 82% who were separated preoperative changed status (from cohabitating mostly to married or separated, and from separated mostly to married or divorced). In contrast, the majority of participants who were married (81%), divorced (74%), widowed (80%), or always single (70%) preoperative remained so throughout the 5-year follow-up. We focus on the 2 primary outcomes, marriage and separation/divorce, below. However, the cumulative incidence of cohabitation, cohabitation/marriage, separation, and divorce by applicable preoperative marital status groups are provided in the supplemental material (Supplemental Figures 1–4 http://links.lww.com/AOSO/A135), as are the number at risk and number of events for each of these outcomes by year (Supplemental Table 3, http://links.lww.com/AOSO/A135).

Marriage

Among 614 participants who were not married preoperative, 90 participants reported being married across 5 years of follow-up (Table 2). The cumulative incidence of marriage at 2 and 5 years was 8% and 18%, respectively (Fig 2A). Those who were cohabitating had the highest probability of marriage (30% by 2 years and 39% by 5 years), followed by those who were separated (11% by 2 years and 24% by 5 years). However, among the 12 participants who were separated preoperative and married 1–5 years postoperative, 7 did not have another marital status in between. Thus, their postoperative status may reflect reconciliation after a trial separation. Among participants who were always single, divorced, or widowed preoperative, the probability of marriage was ≤5% by 2 years, then gradually increased through 5 years to 16%, 12%, and 7%, respectively (Fig 2B).

Unadjusted HRs of incident marriage by preoperative characteristics are reported in Supplemental Table 4, http://links.lww.com/AOSO/A135; aHRs are reported in Table 3. Cohabitating (aHR: 5.25; 95% CI: 2.89–9.52) or being separated (aHR: 3.03; 95% CI: 1.46–6.29) versus always single, younger age (aHR: 1.69 per 10 years; 95% CI: 1.34–2.13), having a college degree versus ≤high school education (aHR: 2.36; 95% CI: 1.19–4.71), lower BMI (aHR: 1.54 per 10 kg/m^2; 95% CI: 1.11–2.12), and lower BDI score (aHR: 1.47 per 10 points; 95% CI: 1.01–2.16) preoperative were independently associated (P <0.10) with increased risk of incident marriage postoperatively.

Among participants who were not married preoperative, 2 of 16 pre- to postoperative changes we evaluated were independently associated (P < 0.10) with being married postoperative: improvement in physical health (aRR = 1.27 per 10 physical component summary score points; 95% CI, 1.10–1.47; P = 0.001) and an increase versus no change in household income (aRR = 2.70; 95% CI, 1.83–3.98; P <0.001).

Separation/Divorce

Among 827 participants who were married preoperative, 95 reported being separated or divorced across follow-up (Table 2). Nearly half who were married preoperative and who reported divorce postoperatively (n = 51) reported separation at an earlier assessment (n = 25).

The cumulative incidence of separation/divorce among those who were cohabitating or married preoperative at 2 and 5 years was 9% and 16%, respectively (Fig 3A). Those who were married had a much lower probability of separation/divorce versus those who were cohabitating (13% versus 44% by 5 years) (Fig 3B).

Unadjusted HR of incident separation or divorce among participants who were married preoperative by preoperative characteristics are reported in Supplemental Table 4, http://links.lww.com/AOSO/A135; aHRs are reported in Table 4. Female sex (aHR: 2.08; 95% CI: 1.09–3.96), younger age (aHR: 1.84 per 10 years; 95% CI: 1.46–2.34), household income <$25,000 versus ≥$100,000 (aHR: 2.48; 95% CI: 1.08–5.71), smoking (aHR: 1.76; 95% CI: 0.99–3.11), alcohol problems (aHR: 1.96; 95% CI: 0.90–4.30), and having sexual desire >once/week versus never (aHR: 2.12; 95% CI: 1.05–4.28) were independently associated at P <0.10 with an increased risk of incident separation or divorce postoperatively.

Four pre- to postoperative changes were independently associated (P < 0.10) with being divorced/separated postoperative: greater weight loss (aRR = 1.50 per 10% of preoperative weight; 95% CI: 1.22–1.84; P < 0.001), decrease versus no change in household income (aRR = 5.36; 95% CI: 3.56–8.07; P = 0.001),

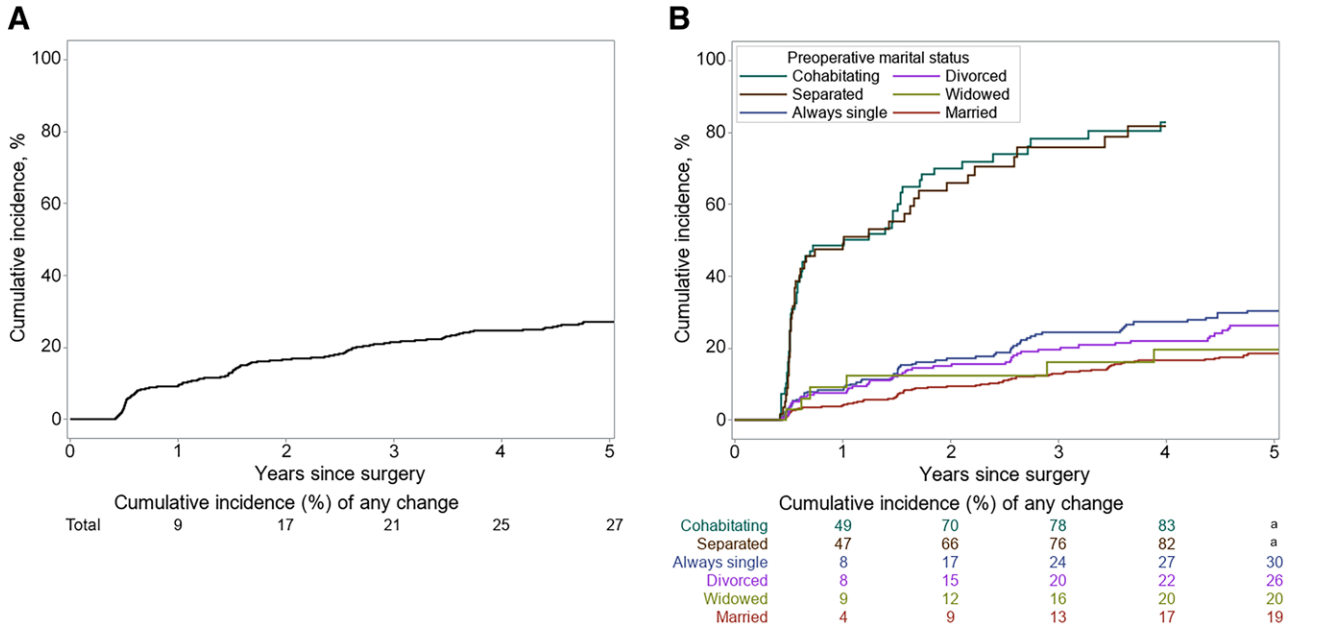

FIGURE 1. Cumulative incidence of change in marital status after RYGB or SG. A, Among all participants. B, Stratified by preoperative marital status.

starting psychiatric medication versus no preoperative or postoperative use (aRR = 1.90; 95% CI: 1.17–3.08; $P = 0.04$), and an increase versus no change in sexual desire (aRR = 3.29; 95% CI: 1.94–5.58; $P < 0.001$).

DISCUSSION

In this large US cohort of adults who underwent RYGB or SG, the majority of those who were married, divorced, widowed, or single at the time of surgery remained so throughout 5 years of follow-up. In contrast, the majority of those who were cohabitating either got married or separated and the majority of those who were separated got divorced or got or resumed being married. Among participants who were not married preoperative, the 5-year cumulative incidence of marriage was 18%. Among participants who were married, the 5-year cumulative incidence of separation or divorce was 13% (8% for divorce). We were able to identify several preoperative predictors of both outcomes, as well as pre- to postoperative changes correlated with each outcome.

Marriage

Two previous studies in Scandinavia reported that bariatric surgery is related to an increased chance of marriage[20] or an incident relationship.[19] While our study did not include a nonsurgical reference group, our measured 5-year cumulative incidence of marriage among unmarried surgical patients (18%) is higher than the estimated 5-year cumulative incidence of

TABLE 2.

Number at risk and number of events (change in marital status, incident marriage, and incident separation or divorce) by year in relation to RYGB or SG among US adults by applicable preoperative marital status

	Year in relation to RYGB or SG surgery									
	0	1	2			3			4	5
Preoperative status	Change in marital status									
	At risk	Event	At risk	Event	At risk	Event	At risk	Event	At risk	Event
Total	1441	133	1265	97	1049	56	908	38	808	23
Married	827	34	770	40	661	25	587	24	526	11
Cohabitating	68	33	34	13	18	4	10	2	7	1
Separated	57	27	30	9	16	4	9	2	6	0
Divorced	213	16	190	15	161	8	137	4	121	6
Widowed	33	3	29	1	25	1	23	1	22	0
Always single	243	20	212	19	168	14	142	5	126	5
	Incident marriage									
Not married	614	25	566	23	481	17	416	16	365	9
Cohabitating	68	13	52	6	37	3	28	0	25	1
Separated	57	5	51	1	42	3	36	3	28	0
Divorced	213	4	202	7	180	3	157	4	139	4
Widowed	33	0	32	1	28	1	25	0	25	0
Always single	243	3	229	8	194	7	170	9	148	4
	Incident separation or divorce									
Married or cohabitating	895	35	836	38	719	23	638	19	579	7
Married	827	21	783	32	679	19	607	16	554	7
Cohabitating	68	14	53	6	40	4	31	3	25	0

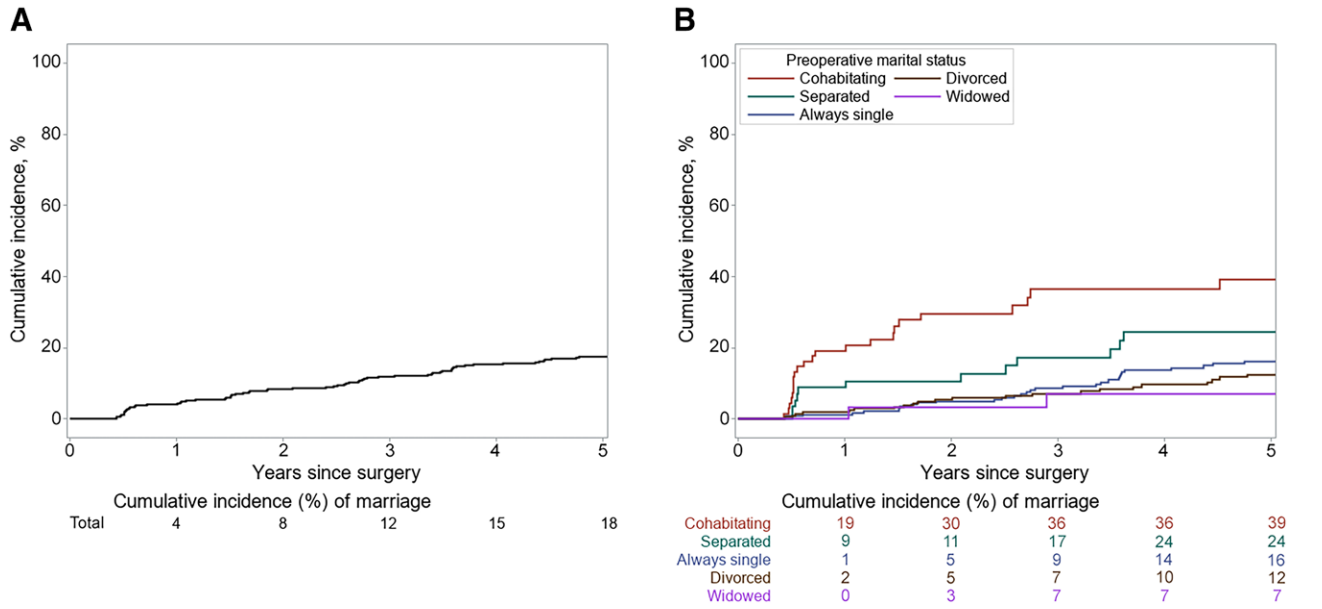

FIGURE 2. Cumulative incidence of marriage after RYGB or SG. A, Among participants who were not married. B, Stratified by preoperative marital status.

marriage in the general US adult population (6.9%) based on the mean annual marriage rate[29] and the percentage of unmarried adults[30,31] from 2007 to 2014. Thus, providing additional support for an association between undergoing bariatric surgery and getting married. Furthermore, marriage incidence in our US surgical cohort was similar to the Scandinavian surgical cohorts (eg, 4-year cumulative incidence of marriage was 15% both in our study and the Swedish gastric bypass cohort[20]).

Among LABS-2 participants not married preoperative, those who were younger, had a college degree, had lower BMI, fewer depressive symptoms, and were cohabitating or separated preoperative had a higher chance of incident marriage. While younger age was predictive of marriage in both previous bariatric surgery studies,[19,20] education level was not predictive of chance of marriage/cohabitation in the Danish study,[20] and in the Swedish study, the chance of marriage did not differ by whether participants had a college versus high school education. However, at least a high school education was associated with a higher chance of marriage versus only primary education.[19] Additionally, having a college degree is associated with getting married in the general US population.[32] While neither previous bariatric study evaluated BMI nor depressive symptoms in relation to the chance of marriage, the Swedish study found that psychotropic medication use preoperative was associated with a lower chance of marriage,[19] which was also implicated in our unadjusted analyses (HR = 0.69; 95% CI: 0.44–1.07).

Independent of preoperative status, postoperative improvement in physical health and increase in household income were related to being married postoperative in our US cohort. Whereas improved physical functioning may have led to behaviors that increased the chance of marriage, household income likely increased as a function of marriage. Surprisingly, we did not find an association at $P < 0.10$ between greater weight loss and being married postoperative, as the Swedish study did,[18] even when as a sensitivity analysis we evaluated the unadjusted association (RR = 0.89 per 10% greater weight loss [95% CI, 0.75–1.05]; $P = 0.16$).

TABLE 3.

Adjusted hazard ratios of incident postoperative marriage among US adults who were not married at the time of RYGB or SG, by preoperative characteristics

	AHR (95% CI)* of marriage N = 568
Marital status (Ref=Always single)	$P < 0.001$
Cohabitating	5.25 (2.89, 9.52)
Separated	3.03 (1.46, 6.29)
Divorced	1.40 (0.73, 2.69)
Widowed	†
Age	$P < 0.001$
per 10 years younger	1.69 (1.34, 2.13)
Education(Ref=high school or less)	$P = 0.03$
Some college/post high school education	1.51 (0.76, 3.00)
College degree or higher	2.36 (1.19, 4.71)
Body mass index kg/m^2	$P = 0.009$
Per 10 units lower	1.54 (1.11, 2.12)
Beck Depression Inventory score	$P = 0.047$
Per 10 units lower	1.47 (1.01, 2.16)

*The multivariable model included the variables in the table, as well as site.
†The estimate was incalculable due to the low number of participants in this category.

Separation/divorce

Our measured 5-year cumulative incidence of divorce among married surgical patients (8%) is higher than the estimated 5-year cumulative incidence of divorce in the general US adult population (3.5%) based on the annual divorce rate[29] and the percentage of married adults[30,31] from 2007 to 2014. These findings suggest an association between undergoing bariatric surgery and getting divorced, consistent with the Scandinavian studies.[19,20] However, the 4- or 5-year cumulative incidence of divorce in our US cohort was about half the values reported in the Scandinavian cohorts (6% versus 14% among the Swedish at 4 years[19]; 8% versus 15% [with propensity score weighting] among the Danish at 5 years).[20]

We chose to evaluate factors related to the combined outcome of separation or divorce because, in the US, separation is followed by divorce in approximately 80% of separations, usually within 3 years,[33] and marriages can end in separation (ie, neither followed by reconciliation nor divorce).[34] Additionally, we only evaluated predictors of separation/divorce among those who were married preoperative because in the US, compared to marriage, unmarried cohabitation is more than twice as likely to end ≤5 years.[34]

Among our US cohort, females, those who were younger, had a household income less than $25,000, smoked, had alcohol

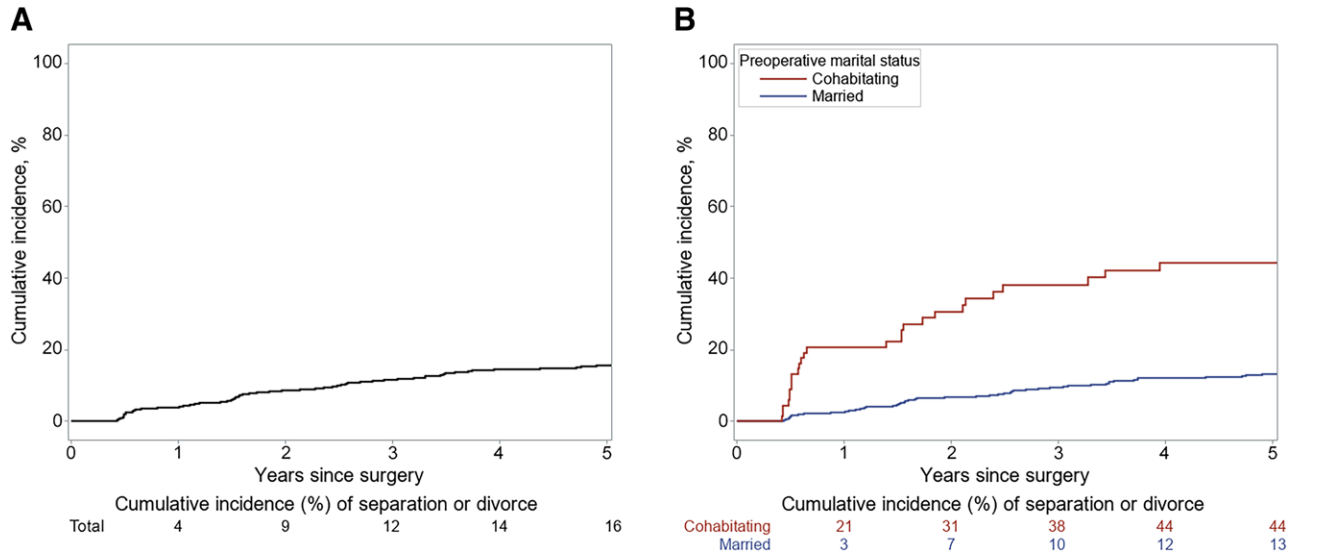

FIGURE 3. Cumulative incidence of separation or divorce after RYGB or SG. A, Among participant who were married or cohabitating. B, Stratified by preoperative marital status.

problems, and had sexual desire more than once a week preoperative had a higher chance of incident separation/divorce. Our finding that females had a higher chance of separation/divorce is in contrast to the Danish study, which found that the risk of becoming single postoperative did not differ by sex.[19] Sex was associated with the chance of divorce in the Swedish study, however, the direction of the association was not specified.[20] Younger age was a risk factor for divorce in both the Danish and Swedish studies and is an established risk factor in the general US population.[23] Neither the Danish nor the Swedish study evaluated income, smoking, or alcohol problems in the year before surgery as predictors. However, the Swedish study reported an increased risk of divorce among those with a preoperative lifetime history of substance abuse.[20] Furthermore, household income less than $25,000, tobacco use, higher alcohol consumption, alcohol use disorder, and other substance use disorders predict separation or divorce among married adults in the general US population.[24,25,34]

Independent of preoperative status, greater weight loss, a decrease in household income, starting psychiatric medication, and an increase in sexual desire were related to getting separated or divorced postoperative. The positive association between weight loss and divorce was also seen in the Swedish cohort[20] and may reflect improved self-image and self-confidence that increase motivation or strength to leave an unhealthy marriage.[18] Additionally, partners of adults who undergo bariatric surgery may feel greater jealousy over their partner's weight loss and attractiveness or feel that they are no longer needed.[35] Household income likely decreased as a function of the separation or divorce.[23] Likewise, factors that prompted starting psychiatric medication may have stemmed from, rather than contributed to, separation or divorce. Although, among a cohort of 20,233 couples, the hazard of divorce was higher among couples in which one or both partners had mental distress.[26]

Sexual activity, frequency of desire, and satisfaction were not related to the chance of incident marriage. However, those with greater sexual desire preoperative and those who had an increase in sexual desire postoperative, independent of preoperative level, had an increased chance of divorce. While qualitative studies have noted that some surgical patients report that as they lost weight their partner showed a renewed or increased sexual interest toward them,[16] other patients report a discordance, in which their desire increases more than their partner's[17], which could explain this finding. This concept is supported by a study which found that couples with similar versus dissimilar health behaviors are at lower risk of divorce.[36]

This report is the first study we know of evaluating changes in marital status in a US bariatric cohort. Strengths of this study include the large sample size, representative of US adults who underwent bariatric surgery in the same time frame,[37] inclusion of "living like married" (referred to as cohabitating) and "no longer married/living like married" (referred to as separated) as categories of marital status, high data completeness at annual assessments over a 5-year duration, appropriate censoring of follow-up to minimize the impact of missing data, and examination of sociodemographic, physical health, and mental health factors that might predict or correlate with change in status. The following limitations should also be considered. First, the study did not have a nonsurgical control group nor did it randomize participants to surgery. To address this limitation we compared our findings to 2007–2014 data from the US general adult population,[29–31] over a third of whom had obesity.[38] However, the comparisons were not adjusted for demographics or clinical characteristics. Thus, the impact of bariatric surgery on change in marital status should be further investigated. Second, we

TABLE 4.

Adjusted hazard ratios of incident postoperative separation or divorce among US adults who were married at the time of RYGB or SG, by preoperative characteristics

	AHR (95% CI) * of separation or divorce N = 780
Sex (Ref=Male)	*P* = 0.03
Female	2.08 (1.09, 3.96)
Age	*P* < 0.001
Per 10 years younger	1.84 (1.46, 2.34)
Household income (Ref= ≥$100,000)	*P* = 0.007
<$25,000	2.48 (1.08, 5.71)
$25,000–$49,999	1.42 (0.72, 2.80)
$50,000–$74,999	1.00 (0.50, 2.02)
$75,000–$99,999	0.51 (0.22, 1.18)
Smoked in past year (Ref=No)	*P* = 0.053
Yes	1.76 (0.99, 3.11)
Alcohol problem (Ref=No)	*P* = 0.09
Yes	1.96 (0.90, 4.30)
Frequency of sexual desire (Ref=Never)	*P* = 0.02
Once a week or less	1.19 (0.60, 2.39)
Few times a week or more	2.12 (1.05, 4.28)

*The multivariable model included the variables in the table, as well as site.

determined change in marital status based on self-report of current status at annual assessments; if a participant had more than one change in marital status between assessments we would not know, as only the most recent change would be indicated. Third, reflecting the popularity of SG at the time the study was conducted,[39] the cohort included a relatively small number of participants who underwent SG versus RYGB. Finally, we did not assess all factors known to predict change in marital status, for example, history of separation or divorce, time in current relationship, and perceived relationship quality.[20]

Conclusions

Among a large cohort of US adults, the majority did not change marital status within 5 years following RYGB or SG. Approximately 18% of participants who were not married preoperative got married. Approximately 14% of participants who were married preoperative got separated or divorced. These estimates of change in marital status are higher than expected based on the percentage of US adults who were married[30–31] and the reported marriage and divorce rates from the same timeframe in the US general adult population.[29] Several preoperative predictors of marriage and of separation or divorce were identified, many of which have been identified in the general population. Greater weight loss was related to a higher chance of postoperative separation or divorce but not marriage.

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