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ORIGINAL CONTRIBUTIONS

Is Bariatric Surgery Safe and Effective in Patients with Inflammatory Bowel Disease?

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Abstract

Background The rate of obesity is rapidly increasing in patients with inflammatory bowel disease (IBD), but whether bariatric surgery in patients with IBD is safe and effective is not well understood.

Methods A retrospective review of patients with IBD undergoing bariatric surgery across a multi-state health system was performed. Thirty-day postoperative outcomes, weight loss, and long-term complications were recorded.

Results Thirty-one patients (81% female) with IBD and a mean preoperative body mass index (BMI) of 42.4 kg/m^2 underwent 32 bariatric operations (n = 14 Roux-en-Y gastric bypass, n = 14 sleeve gastrectomy, n = 4 gastric band). Short-term infectious complications included superficial surgical site infection (n = 2), infected intra-abdominal hematoma (n = 1), and a hepatic abscess (n = 1). Percent excess weight loss was 57.2% (n = 25) at 6 months, 62.9% (n = 22) at 12 months, and 57.4% (n = 11) at 24 months. No IBD flares requiring surgery were observed at a median follow-up of 2.7 years (interquartile range, 0.8–4.2 years).

Conclusion In carefully selected patients with IBD, bariatric surgery appears safe with respect to short-term infectious complications and results in sustained weight loss until at least 2 years postoperatively.

Keywords Crohn's disease · Ulcerative colitis · Bariatric surgery · Inflammatory bowel disease

Introduction

In parallel with its rise in the general population, obesity has reached epidemic proportions among patients with inflammatory bowel disease (IBD) [1]. This has affected multiple aspects of the medical care of these patients, particularly with respect to an increased loss of response to biologic agents over time [2] and increased difficulty in the dosing of weight-based immunosuppression [1, 3]. Moreover, obese patients with IBD report a lower quality of life than their normal-weight counterparts [1].

In patients without IBD, bariatric surgery is an established treatment modality for serious and severe obesity, and is known to have a low rate of complications [4] and result in durable weight loss [5, 6]. However, short-, mid-, and long-term outcomes of bariatric surgery are less well studied in patients with IBD and consist of either single-center series [7–11] or analyses of administrative data with a large number of patients but that lack information on post-discharge complications and long-term outcomes [12, 13]. In 2017, a systematic review identified 43 patients with IBD undergoing bariatric surgery across seven studies and concluded that further studies are necessary to confirm the safety and efficacy of bariatric surgery in patients with IBD [14]. More recently, a systematic review that identified 101 patients concluded that bariatric surgery appears to be safe in "carefully selected patients with IBD [15]."

Therefore, we aimed to evaluate the short-, mid-, and long-term safety and efficacy of bariatric surgery in a cohort of patients with IBD across a multi-state health system.

Presentation The accompanying abstract was presented as a quick shot presentation at the 2019 Society for Surgery of the Alimentary Tract Annual Meeting as part of Digestive Diseases Week in San Diego, CA on May 18, 2019.

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Methods

Mayo Clinic Institutional Review Board approval was obtained. A centralized diagnostic and operative index was searched for adult patients who underwent bariatric surgery between August 1, 2006, and December 31, 2017, at Mayo Clinic Arizona, Mayo Clinic Florida, or Mayo Clinic Rochester. Bariatric operations included Roux-en-Y gastric bypass (RYGB), sleeve gastrectomy (SG), and gastric band placement. This list was then queried to see which patients had ever been given a diagnosis of IBD (Crohn's disease [CD], ulcerative colitis [UC], or IBD indeterminate). A retrospective chart review was then conducted of these patients to confirm a diagnosis of IBD at the time of bariatric surgery and to obtain the relevant data points.

Variables

Preoperative characteristics abstracted included age, sex, weight and body mass index (BMI), and obesity-related comorbidities (hypertension, prediabetes/type 2 diabetes, sleep apnea, non-alcoholic fatty liver disease, chronic joint disease, dyslipidemia, coronary artery disease, gastric reflex, and venous stasis) at the time of surgery. IBD-specific characteristics included the Montreal classification disease location [16], duration of IBD, prior intestinal resection for IBD, and preoperative medications for IBD. For patients with UC who had undergone prior ileal pouch anal anastomosis (IPAA) in two or three stages, only the IPAA formation was recorded as a prior operation for the purposes of this study in order to avoid double or triple recording of prior IBD-related operations in these patients. A patient was considered to be on a corticosteroid or an immunomodulator if the last dose was taken within 4 weeks of surgery, and on a biologic if the last dose was taken within 12 weeks of surgery. Operative reports were reviewed to determine the specific bariatric operation performed, and if the operation was completed in a laparoscopic or open manner.

Complications and Outcomes

Complications were defined as short-term if they occurred within 30 days of the operation and long-term if they occurred 31 days or more postoperatively in accordance with the American Society for Metabolic and Bariatric Surgery (ASMBS) outcome reporting standards [17]. Complications collected included short-term infectious complications, short-term readmission (within 30 days of discharge), short-term reoperation, and long-term reoperation. Patient weight and BMI were abstracted where available from the medical record at the follow-up visit closest to 6, 12, and 24 months postoperatively with an evaluation window of ± 60 days to account for follow-up that occurred in close proximity designated time points. Change in BMI, percent total weight loss, and percent excess weight loss at these time points was reported in accordance with the ASMBS outcome reporting standards [17]. Data on medications for IBD at last follow-up and the need for future IBD-related surgery were also recorded.

Patient Selection

Patients who eventually underwent bariatric surgery were assessed in the preoperative setting by a board-certified general surgeon. The majority of these patients were referred by their gastroenterologist for consideration of weight-loss surgery. The operating surgeon assessed their qualifications for bariatric surgery, as well as their history of IBD. Specific focus was paid to their current medical regimen, how well controlled their IBD was at the current time, and the location of their IBD. Location is particularly important in patients with Crohn's disease, as they can have upper gastrointestinal disease. The decision to perform bariatric surgery was typically multi-disciplinary in fashion between the surgeon and the patient's gastroenterologist. SG is typically preferred in the setting of CD since the risk of disease activation in the Roux limb exists. However, in the setting of severe gastroesophageal reflux, RYGB can be considered with thorough and detailing counseling of the patient of the risks of RYGB in a patient with CD. Unfortunately, we are limited to only patients who underwent bariatric surgery, as we cannot identify patients who were denied surgery to see what the specific reasons were.

Statistics

Categorical variables are presented as the number (percent) and continuous variables are presented as the mean (standard deviation) or median (interquartile range [IQR]). All analysis was performed using JMP® Pro, Version *14.1.0* (SAS Institute Inc., Cary, NC, 1989–2019).

Results

Thirty-one patients (81% female) with IBD (n = 20 UC, 10 CD, 1 IBD indeterminate) underwent 32 bariatric operations (one patient underwent gastric banding and then subsequently had a sleeve gastrectomy) at one of three sites (n = 29 Rochester, 4 Florida, 1 Arizona) in the study period. With respect to IBD characteristics, the median duration of IBD before surgery was 13.3 years. Nine patients were on preoperative immunosuppression (n = 4 biologics, 3 immunomodulators, 2 corticosteroids), and 11 patients had undergone prior intestinal resection.

Table 1 Demographics, IBD characteristics, and mean initial body mass index

Characteristic	Total (n = 32)	RYGB (n = 14)	SG (n = 14)	GB (n = 4)
Age – years, median (IQR)	50.7 (40.6–57.0)	50.7 (44.7–54.9)	53.2 (39.3–58.3)	41.4 (37.6–51.2)
Sex, female	26 (81)	14 (100)	9 (64)	3 (75)
Inflammatory bowel disease type				
Ulcerative colitis	20 (63)	9 (64)	7 (50)	4 (100)
Crohn's disease	11 (35)	4 (29)	7 (50)	0 (0)
Indeterminate	1 (3)	1 (7)	0 (0)	0 (0)
Duration of disease – years, median (IQR)	13.3 (6.6–20.2)	10.8 (4.7–27.1)	16.4 (8.1–21.5)	10.6 (4.6–16.0)
Montreal class disease location				
Crohn's disease (n = 11)				
L1 (ileal)	6 (55)	3 (75)	3 (43)	–
L2 (colonic)	3 (27)	1 (25)	2 (29)	–
L3 (ileocolonic)	0 (0)	0 (0)	0 (0)	–
L4 (isolated upper GI disease)	1 (9)	0 (0)	1 (14)	–
L1+L4 (ileal and upper GI disease)	1 (9)	0 (0)	1 (14)	–
Ulcerative colitis (n = 20)				
E1 (ulcerative proctitis)	3 (15)	3 (33)	0 (0)	0 (0)
E2 (left-sided ulcerative colitis)	6 (30)	1 (11)	2 (29)	3 (75)
E3 (extensive ulcerative colitis)	10 (50)	4 (44)	5 (71)	1 (25)
Missing	1 (5)	1 (11)	0 (0)	0 (0)
Immunosuppression				
Corticosteroids	2 (6)	1 (7)	1 (7)	0
Immunomodulator	3 (9)	1 (7)	2 (14)	0
Biologics	4 (13)	3 (21)	1 (7)	0
Prior surgery for IBD	11 (34)	2 (14)	7 (50)	2 (50)
Ileocolic resection	4	1	3	0
Subtotal colectomy	2	0	2	0
IPAA	3	1	0	2
TPC	1	0	1	0
Small bowel resection	1	0	1	0
Mean preoperative BMI (± SD)	42.4 (4.8)	42.2 (5.0)	42.1 (5.1)	44.1 (3.3)
Obesity-related comorbidity				
Hypertension	19 (59)	11 (79)	7 (50)	1 (25)
Prediabetes/type 2 diabetes	23 (72)	10 (71)	10 (71)	3 (75)
Sleep apnea	22 (69)	11 (79)	9 (64)	2 (50)
NAFLD	7 (22)	2 (14)	4 (29)	1 (25)
Chronic joint disease	16 (50)	7 (50)	6 (43)	3 (75)
Dyslipidemia	19 (59)	10 (71)	7 (50)	2 (50)
Coronary artery disease	1 (3)	0 (0)	1 (7)	0 (0)
Gastric reflux	14 (44)	7 (50)	6 (43)	1 (25)
Venous stasis	0 (0)	0 (0)	0 (0)	0 (0)

All data presented as number (%) unless otherwise noted. *GI*, gastrointestinal; *IPAA*, ileal pouch anal anastomosis; *TPC*, total proctocolectomy; *NAFLD*, non-alcoholic fatty liver disease

A RYGB was performed in 14 patients (n = 9 UC, 4 CD, 1 IBD indeterminate), a SG in 14 patients (n = 7 UC, 7 CD), and a gastric band in 4 patients (n = 4 UC). Indications for gastric banding were patient-preference (n = 1), the surgeon believing this to be the more conservative operation (n = 1), and the patient being status post an IPAA and having multiple stools per day at baseline (n = 2). All operations were completed laparoscopically except for two of the RYGBs. Mean (±SD)

Table 2 Short- and long-term complications

Outcome or complication	Number (%)
Length of stay, mean (± SD)	3.6 (2.4)
Infectious complications within 30 days	4 (12)
Superficial surgical site infection	2 (6)
Infected intra-abdominal hematoma	1 (3)
Hepatic abscess	1 (3)
Readmission within 30 days	5 (15)
Dehydration	2 (6)
Syncope	1 (3)
Infected intra-abdominal hematoma	1 (3)
Hepatic abscess	1 (3)
Reoperation within 30 days	1 (3)
Biliopancreatic limb obstruction	1 (3)
Reoperation after 30 days	6 (18)
Failed gastric band	3 (9)
Cholecystectomy	1 (3)
Petersen's hernia reduction + cholecystectomy	1 (3)
Jejunojejunostomy hernia	1 (3)

BMI of the cohort before intervention was 42.4 kg/m^2 (± 4.8) (Table 1).

The average postoperative hospitalization length of stay for the entire cohort was 3.6 days, and four short-term infectious complications were observed (n = 2 superficial surgical site infections, 1 infected intra-abdominal hematoma treated by percutaneous aspiration and antibiotics, 1 hepatic abscess treated by percutaneous drainage and antibiotics). Five patients were readmitted within 30-days of discharge. Long-term reoperation was required for failed gastric band (n = 3), reduction of internal hernia (n = 2), and cholelithiasis (n = 2) (Table 2).

The mean (±SD) percentage of the overall excess weight loss was 57.2% (± 25.7) at 6 months, 62.9% (± 33.8) at 12 months, and 57.4% (± 27.5) at 24 months. Mean excess weight loss, total weight loss, and BMI changes for RYGB, SG, and gastric are reported at 6, 12, and 24 months postoperatively in Table 3. Immunosuppression medication requirements remained largely unchanged after surgery (Table 4). There were no IBD flares requiring surgery at a total follow-up time ranging from 1 month to 10 years (median 2.7 years, IQR 0.8–4.2 years)

Discussion

The prevalence of obesity is increasing in patients with IBD in parallel with its rise in the general population. However, while bariatric surgery is a safe, effective, and well-accepted therapy for severe obesity in patients without IBD, its role in the treatment of obesity in patients with IBD is more controversial. In this multi-center study, bariatric surgery was safe in patients with IBD with no observed increase in infectious complications related to the underlying disease IBD process. Additionally, sustained weight loss was observed at 6, 12, and 24 months postoperatively, and no patients suffered a subsequent flare of their IBD that required revision of their bariatric procedure.

The current study adds to the growing body of evidence that bariatric surgery is safe in carefully selected patients with IBD. Unlike in ileocolic resection for CD where anastomotic leak rates are 10% [18–20] and in IPAA for medically refractory UC where the rates of pelvic sepsis are between 5 and 10% [21–23], we did not observe any anastomotic or staple

Table 3 Weight loss at 6, 12, and 24 months after surgery stratified by operation type

Time interval	Weight outcomes and number of patients	RYGB (n = 14)	SG (n = 14)	GB (n = 4)
6 months	Number of patients	11	10	4
	% EWL	68.6 ± 22.5	59.8 ± 17.8	19.1 ± 14.7
	% TWL	26.6 ± 7.4	22.6 ± 8.0	8.0 ± 6.2
	Mean BMI change (kg/m^2)	11.1 ± 3.1	9.3 ± 4.0	3.5 ± 2.8
12 months	Number of patients	11	7	4
	%EWL	79.2 ± 27.3	63.4 ± 25.9	17.4 ± 20.9
	%TWL	31.0 ± 9.9	27.4 ± 10.8	7.2 ± 9.1
	Mean BMI change (kg/m^2)	13.0 ± 4.5	11.6 ± 5.4	3.1 ± 4.1
24 months	Number of patients	5	5	1
	% EWL	77.7 ± 18.6	46.8 ± 17.4	8.7*
	%TWL	31.0 ± 5.2	20.1 ± 9.3	3.8*
	Mean BMI change (kg/m^2)	13.4 ± 3.3	8.9 ± 4.6	1.7*

All data represents the mean ± standard deviation except where otherwise noted. *EWL*, excess weight loss; *TWL*, total weight loss

*Represents actual value as only one patient

Table 4 Immunosuppression changes from surgery to time of last follow-up

	Preoperative immunosuppression to postoperative immunosuppression	Number of patients
No change	Remained on a biologic	2
	Immunomodulator to biologic	1
	Remained on a corticosteroid	2
	Remained on an immunomodulator	2
Increased	None to an immunomodulator	1
Decreased	Biologic to none	2

line leaks after bariatric operations. In their review article on the safety of bariatric surgery in patients with IBD (n = 43), Shoar et al. found only one anastomotic leak reported in the literature [14]. Additionally, a study using the Nationwide Inpatient Sample found that having an underlying diagnosis of IBD did not have a significant effect on inpatient anastomotic complications after bariatric surgery compared to patients without IBD [13]. The difference in leak rates between the operations is likely secondary to the different indications for surgery in these patient groups. Patients undergoing ileocolic resection for CD have failed medical therapy, have active ongoing inflammation, and are often on multiple medications at the time of surgery. Similarly, patients with UC who require subtotal colectomy and desire an IPAA are increasingly undergoing staged operations to avoid performing an anastomosis in a patient who has failed medical therapy [24]. Conversely, in patients undergoing bariatric surgery, the use of immunosuppressive medications to control a patient's IBD is less frequent, with only 33% of the patients in the current study on preoperative immunosuppressive regimens. While no guidelines exist on the perioperative management of biologic medications before bariatric surgery, the best method is likely to operate at the end of the last dosing cycle to allow maximum biologic washout, as is recommended by the American College of Rheumatology before hip and knee arthroplasty [25]. This would result in only one biologic dose being missed and allow resumption of the patient's medications approximately 2–4 weeks postoperatively depending on the dosing cycle.

Other infectious complications were also infrequent, with only two patients experiencing a superficial surgical site infection. Superficial surgical site infection is common after intestinal resection for CD with rates as high as 15% reported in obese patients [26]. Since laparoscopic surgery is protective against the development of a superficial surgical site infection, this likely reduces some of the impact of the underlying diagnosis of CD [27]. Two of the five early readmissions after surgery were for dehydration. Dehydration is a leading cause for readmission after bariatric surgery [28–30], and this could potentially be exacerbated in patients with IBD due to the increased propensity for diarrhea as a symptom of the underlying IBD. Additionally, one of these patients had undergone prior ileocolic resection, which may have placed them at an increased risk of dehydration. Implementation of outpatient infusion protocols has proven effective in patients without IBD [31], and they would likely also reduce readmissions for dehydration in patients with IBD.

Equally importantly to the low rate of complications is that patients with IBD achieved sustained weight loss up to 2 years after RYGB and SG. Percent excess weight loss of 79% after RYGB and 63% after SG at 12 months is similar to what has been reported in both patients with IBD undergoing these operations [8, 10] as well as patients without IBD [5]. In patients without IBD, operation choice between the two is based on specific individual patient factors. The presence of IBD makes this decision more complex since CD could potentially activate in the upper gastrointestinal tract or require terminal ileum resection which would shorten the common channel after RYGB. In a patient with UC, the potential for the patient to eventually require subtotal colectomy and potentially IPAA can also be more difficult in the setting of RYGB anatomy. Therefore, a SG may be preferred in patients with IBD. This is reflected in the literature where the majority of bariatric operations reported in patients with IBD are SG [14]. However, there is a growing number of RYGBs being reported in patients with IBD without adverse consequences [10], so in the presence of contraindications for SG, RYGB is likely reasonable to offer in carefully selected patients without evidence of upper gastrointestinal CD. These patients would require extensive counseling preoperatively of the risk of disease activation at either of their anastomoses and the potential need for subsequent surgical revision. Additionally, they should be counseled on the potential increased risk of malabsorption if they have had or in the future need an ileocolic resection.

Fortunately, in the current series, we did not observe any future IBD flares that required surgical intervention after bariatric surgery. This could stem from several factors including likely careful selection of which patients with IBD were candidates for bariatric surgery. Supporting this is the relatively low rates of prior intestinal resection and preoperative immunosuppression use in this study. The two other series that also had more than 25 patients reported similarly low rates of preoperative

immunosuppression, with Heshmati et al. reporting a 17% rate of biologic usage [10] and Aelfers et al. reporting a 6% rate of biologic usage [8]. In addition to not observing any future disease flares requiring surgery, we did not observe any major changes in the medical management of IBD at last follow-up. Heshmati et al. also had a similar finding with less than 10% of patients requiring increased medication after surgery to treat their IBD [10]. As IBD is a chronic process, there is a need for studies with increased longitudinal follow-up to confirm these findings.

This study has a number of limitations secondary to its retrospective review of the medical record. First, for patients who either did not return for follow-up or who followed-up outside our designated time windows, we cannot obtain their weights to assess the efficacy of their bariatric surgery. Second, though this represents a relatively large sample of patients compared with what is currently known, the sample size remains overall small precluding meaningful comparisons to be made between operation choice and diagnosis of CD or UC. Third, IBD is a chronic inflammatory condition and our median follow-up was only 3 years so it is possible that with increased time patients will develop IBD-related complications that require surgery. Lastly, there is likely significant selection bias present where the patients deemed candidates for bariatric surgery had inactive or mild IBD, and therefore, the results cannot and should not be extrapolated to all patients who are obese and have IBD. Related to this, we also cannot identify patients with IBD who desired bariatric surgery but were denied surgery secondary to active disease. Despite these limitations, the present study adds a significant number of cases to the existing literature that continues to suggest bariatric surgery is safe in select patients with IBD.

Conclusion

In highly selected patients with well-controlled IBD, RYGB and SG are both safe with a low rate of postoperative complications, and effective with patients experiencing sustained weight loss over a 2-year period. SG and RYGB produced similar results in patients with UC and CD within this cohort, but caution should be exercised before performing a malabsorptive operation in a patient with CD. Increased utilization of bariatric surgery may help mitigate the obesity epidemic that is ongoing within this patient population.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This was a retrospective review and for this type of study, formal consent is not required.

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