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Original article

Bariatric Surgery is Safe for Patients After Recovery from COVID-19

R. Wesley Vosburg, M.D., F.A.C.S., F.A.S.M.B.S.^{a,*},
Janey S. A. Pratt, M.D., F.A.C.S., F.A.S.M.B.S.^b, Tammy Kindel, M.D., Ph.D.^c,
Ann M. Rogers, M.D., F.A.C.S., F.A.S.M.B.S.^d, Siddharth Kudav, M.D.^e,
Ambar Banerjee, M.D., F.A.C.S., F.A.S.M.B.S.^f, Edward Hernandez, M.D.^f,
Dimitrios Athanasiadis, M.D.^f, Laura E. Fischer, M.D., M.S.^g, Kellen Hayes, M.D.^h,
Thomas H. Shin, M.D., Ph.D.ⁱ, Ali Aminian, M.D., F.A.S.M.B.S.ⁱ,
Julie J. Kim, M.D., F.A.C.S., F.A.S.M.B.S.^a

^aHarvard Medical School, Department of Surgery, Mount Auburn Hospital, Waltham, Massachusetts

^bStanford University School of Medicine, Department of Surgery, Division of Pediatric Surgery, Lucile Packard Children's Hospital, Palo Alto, California

^cMedical College of Wisconsin, Department of Surgery, Froedtert Hospital, Milwaukee, Wisconsin

^dPenn State College of Medicine, Department of Surgery, Penn State Hershey Medical Center, Hershey, Pennsylvania

^eDepartment of Surgery, Robert Wood Johnson University Hospital–New Brunswick

^fDepartment of Surgery, Indiana University School of Medicine, Indianapolis, Indiana

^gDepartment of Surgery, University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma

^hDepartment of Surgery, Allegheny Health Network, Pittsburgh, Pennsylvania

ⁱDepartment of Surgery, Cleveland Clinic Lerner College of Medicine, Cleveland Clinic Foundation, Cleveland, Ohio

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Abstract

Background: Studies of patients who have undergone surgery while infected with COVID-19 have shown increased risks for adverse outcomes in both pulmonary complications and mortality. It has become clear that the risk of complications from perioperative COVID-19 infection must be weighed against the risk from delayed surgical treatment. Studies have also shown that prior bariatric surgery conveys protection against mortality from COVID-19 and that obesity is the biggest risk factor for mortality from COVID-19 infection in adults under 45 years of age. Studies in patients who have fully recovered from COVID-19 and underwent elective surgery have not become widely available yet.

Objectives: This multi-institutional case series is presented to highlight patients who developed COVID-19, fully recovered, and subsequently underwent elective bariatric surgery with 30-day outcomes available.

Setting: Nine bariatric surgery centers located across the United States.

Methods: This multicenter case series is a retrospective chart review of patients who developed COVID-19, recovered, and subsequently underwent bariatric surgery. Fifty-three patients are included, and 30-day morbidity and mortality were analyzed.

Results: Thirty-day complications included esophageal spasm, dehydration, and ileus. There were no cardiovascular, venous thromboembolism (VTE) or respiratory events reported. There were no 30-day mortalities.

Conclusions: Bariatric surgery has been safely performed in patients who made a full recovery from COVID-19 without increased complications due to cardiovascular, pulmonary, venous

*Correspondence: R. Wesley Vosburg, M.D., Harvard Medical School, Department of Surgery, Mount Auburn Hospital, 355 Waverley Oaks Rd, Suite 100, Waltham, MA 02452

E-mail address: rvosburg@mah.harvard.edu (R.W. Vosburg).

thromboembolism, or increased mortality rates. (*Surg Obes Relat Dis* 2021;17:1884–1889.) © 2021 American Society for Bariatric Surgery. Published by Elsevier Inc. All rights reserved.

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In December 2019, COVID-19, caused by SARS-CoV-2, originated in Wuhan, China [1]. COVID-19 disseminated rapidly throughout China and subsequently to the rest of the world, resulting in a declaration of the disease as a pandemic by the World Health Organization on March 11, 2020 [2]. This disease produces a wide clinical spectrum in infected patients, ranging from asymptomatic carriers to critical illness and fatalities. After the first 70,000 cases, the mortality rate was reported to be 2.3% [3].

On March 13, 2020, the United States declared a national emergency due to COVID-19 [2]. Case numbers of COVID-19 surged, and patient care facilities faced a significant influx of patients with varying disease severity states and limited testing capacity. As a result of the rapidly changing situation, public health measures were put into place by the Department of Public Health along with governmental leadership. The state of Massachusetts, for example, halted elective, nonemergent surgeries on March 15, 2020 to protect patients and healthcare professionals and to preserve critical supplies of personal protective equipment [4]. At the time this paper was written, the United States had recorded 29,573,712 cases and 537,417 deaths due to COVID-19 [5].

Initial reports from Aminian et al. on a series of 3 patients who underwent uneventful elective surgeries and contracted COVID-19 in the perioperative period (incisional hernia repair, cholecystectomy, and cholecystectomy with concomitant hysterectomy) showed very concerning outcomes. Nonspecific symptoms such as fever and cough, combined with the lack of readily available and reliable testing and effective treatment strategies, led to a high morbidity and mortality rate in patients infected after surgery (2 patients developed acute respiratory distress syndrome, which progressed to death, and the third made a full recovery) [6]. Additionally, perioperative COVID-19 diagnoses have been found to cause up to a 50% risk of postoperative pulmonary complications with a high resulting mortality risk. This has resulted in recommendations to weigh the risk of surgery in COVID-19–positive patients versus the risk of delayed surgical treatment [7].

On June 8, 2020, elective surgical procedures were allowed to resume under Phase II of Massachusetts reopening due to improving public health data related to COVID-19 [8].

The patient series presented in this paper consists of patients who contracted COVID-19 during the pandemic. Prior to surgery, they each made a recovery from the disease and then underwent elective surgical weight loss procedures at 1

of 9 bariatric centers across the United States. The rationale for this study was to identify if 30-day morbidity or mortality rates were increased in patients who recovered from COVID-19 prior to bariatric surgery. We also sought to determine whether consistencies existed in preoperative workup or postoperative care for these individuals within this cohort.

Methods

This study was approved by the Mount Auburn Hospital and Harvard Medical School institutional review boards. Institutional review board approval and data transfer agreements were contracted as required by each participating institution. Patient consent was waived due to the retrospective nature of the study. All patients with a COVID-19 diagnosis prior to undergoing weight loss surgery at 9 institutions in the United States were identified by electronic medical record review and included. All patients underwent multidisciplinary evaluation prior to surgery. Electronic medical records were retrospectively reviewed by the authors at their respective institutions to collect data. Deidentified data was transferred in a HIPAA-compliant manner to the lead institution via data transfer agreement protocols. Degree of symptoms with COVID-19 infection was categorized as asymptomatic, mild (outpatient management), moderate (inpatient management), and severe (intensive care unit admission). Descriptive statistical analysis was used.

Results

Complete patient data are listed in [Table 1](#). Results from the data analysis are listed in [Table 2](#). Data on 53 patients were collected from 9 bariatric programs in the United States. Most patients (81.1%) were women. The average age was 42.9 years (range 16–64). The average body mass index was 47.3 kg/m² (range 27–86.6). Average time from COVID-19 diagnosis to surgery was 82.5 days for the entire cohort (range 12–290), 54 days for asymptomatic patients, and 102.5 days for mildly symptomatic patients. Twenty (37.7%) patients had asymptomatic disease, 30 (56.6%) patients had mild disease, 2 (3.8%) patients had moderate disease, and 1 (1.9%) patient had severe disease. Most patients (77.4%) had a negative confirmatory, molecular COVID-19 test prior to surgery; however, few patients had post-COVID, preoperative chest imaging (24.5%). Fifty-two of 53 (98.1%) patients had resolved their COVID-19

Table 1
Multi-institutional data of 53 COVID-19 patients undergoing elective bariatric surgery

Age, yr	Sex	Preop BMI	Symptoms during COVID-19 infection	Preoperative symptom resolution	Preoperative negative molecular COVID-19 test	Preoperative imaging	Days from positive COVID-19 test to surgery	Procedure type	LOS (d)	Postdischarge DVT prophylaxis	30-d complications
27	M	76.5	Asymptomatic	NA	Yes	Normal CXR	58	SG	1	Yes: 14-d LMWH	None
47	F	37.6	Asymptomatic	NA	No	None	31	SG	1	No	None
16	M	51.0	Asymptomatic	NA	Yes	Normal CXR	137	SG	4	No	Esophageal spasm, resolved with lorazepam
43	F	50.1	Asymptomatic	NA	Yes	None	44	GBP	2	No	None
48	M	43.0	Asymptomatic	NA	Yes	None, pulmonology eval	145	SG	1	No	None
37	F	45.0	Asymptomatic	NA	No	None, pulmonology eval	12	SG	1	No	None
40	F	43.1	Asymptomatic	NA	Yes	None	34	SG	1	No	None
39	F	44.2	Asymptomatic	NA	Yes	None	53	DS	2	No	None
36	F	53.2	Asymptomatic	NA	Yes	None	25	GBP	2	Yes: 21-d LMWH	Readmission for dehydration
31	F	42.2	Asymptomatic	NA	No	None	47	SG	2	No	None
47	F	41.6	Asymptomatic	NA	No	None	23	Revision	3	Yes: 21-d LMWH	None
49	M	46.0	Asymptomatic	NA	Yes	None	42	GBP/HH	1	No	None
40	F	38.8	Asymptomatic	NA	Yes	None	49	SG/HH	1	No	None
43	F	48.6	Asymptomatic	NA	Yes	CXR: bilateral basilar infiltrates with patchy opacities	22	GBP	1	No	None
53	F	36.9	Asymptomatic	NA	Yes	None	28	Revision	1	No	Ileus requiring readmission
57	F	63.1	Asymptomatic	NA	Yes	None	36	SG	1	Yes: 14-d LMWH	None
42	F	46.7	Asymptomatic	NA	Yes	None	41	GBP	3	No	None
59	M	33.9	Asymptomatic	NA	No	None	70	GBP	1	No	None
64	F	39.7	Asymptomatic	NA	Yes	None	121	SG/cholecystectomy	2	No	None
40	F	41.0	Asymptomatic	NA	Yes	None	62	GBP	1	No	None
45	F	41.0	Mild	Yes	Yes	Normal CXR	105	SG/HH	1	No	None
40	F	49.5	Mild	Yes	Yes	Normal CXR	101	SG/HH	1	No	None
31	F	39.7	Mild	Yes	yes	Normal CXR	122	SG/HH	1	No	None
24	M	86.6	Mild	Yes	Yes	None	69	SG	4	Yes: LMWH bridge to coumadin	None
47	F	47.0	Mild	Yes	Yes	None	50	SG	1	Yes: 14-d LMWH	None
43	M	36.0	Mild	No, persistent mild dyspnea	Yes	Normal CXR	73	SG	1	No	None
28	M	46.0	Mild	Yes	Yes	None, pulmonology eval	148	SG	1	No	None

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Table 1 (continued)

Age, yr	Sex	Preop BMI	Symptoms during COVID-19 infection	Preoperative symptom resolution	Preoperative negative molecular COVID-19 test	Preoperative imaging	Days from positive COVID-19 test to surgery	Procedure type	LOS (d)	Postdischarge DVT prophylaxis	30-d complications
34	F	47.0	Mild	Yes*	Yes	None, pulmonology eval	246	SG/HH	1	No	None
37	F	36.0	Mild	Yes	Yes	None	290	Revision	3	No	None
33	F	41.0	Mild	Yes*	Yes	None	26	SG	1	No	None
37	F	44.1	Mild	Yes	Yes	None	63	Revision	1	No	None
51	F	44.3	Mild	Yes	Yes	None	31	GBP/HH	2	No	None
25	F	49.1	Mild	Yes	Yes	None	36	GBP	1	No	None
40	F	59.3	Mild	Yes*	Yes	None	36	SG	1	No	None
51	F	42.0	Mild	Yes	Yes	None	150	SG	1	No	None
51	F	48.7	Mild	Yes	Yes	None	38	SG	1	No	None
47	F	37.7	Mild	Yes	No	None	34	SG	1	No	None
56	F	46.2	Mild	Yes*	No	CXR: peribronchial wall thickening, CT chest: scarring within the lingula	90	GBP, umbilical hernia repair	1	No	None
51	F	56.8	Mild	Yes	No	Normal CXR	97	GBP	3	No	None
32	F	44.0	Mild	Yes	No	Normal CXR	97	GBP	3	No	None
30	F	42.9	Mild	Yes	No	None	47	GBP	1	No	None
60	F	46.4	Mild	Yes	No	None	49	SG	2	Yes: 14-d LMWH	readmission for dehydration, elevated troponin and ventricular tachycardia
52	F	59.5	Mild	Yes	Yes	Normal CXR	49	SG	2	Yes: 14-d LMWH	None
63	F	73.3	Mild	Yes	Yes	None	57	SG	2	Yes: 14-d LMWH	None
36	F	39.8	Mild	Yes	No	None	63	SG	1	No	Readmission for abdominal pain
58	F	42.5	Mild	Yes	Yes	None	114	GBP	1	Yes: 14-d LMWH	None
32	F	43.9	Mild	Yes	Yes	None	122	SG	1	No	None
32	F	71.3	Mild	Yes	Yes	None	174	SG	1	Yes: 14-d LMWH	None
39	F	71.3	Mild	Yes	Yes	None	249	SG	2	No	None
47	M	27.5	Mild	Yes	Yes	None	249	Revision	1	No	Readmission for dehydration
60	F	48.0	Moderate	Yes	Yes	None, pulmonology eval	93	Revision	1	No	None
60	F	50.0	Moderate	Yes	Yes	Normal CXR	81	SG/HH	1	No	None
44	M	27.0	Severe	Yes	Yes	CXR: small bilateral pleural effusions with patchy airspace opacities, s/p tracheostomy	45	LAGB adjustment then emergent removal	4	Yes: therapeutic Lovenox for recent DVT	Surgical site hematoma requiring incision and drainage

BMI = body mass index; DVT = deep vein thrombosis; LOS = length of stay; CXR = chest X-ray; SG = sleeve gastrectomy; GBP = gastric bypass; HH = hiatal hernia repair; LMWH = low-molecular-weight heparin; LAGB = laparoscopic adjustable gastric band.

* Diminished taste and smell persisted.

Table 2
Summary data of 53 patients with COVID-19 undergoing elective bariatric surgery

Variables	Result
Female, %	81.1
Age, mean (\pm SD, range), yr	42.9 (\pm 10.2, 16–64)
Preoperative BMI, mean (\pm SD, range), kg/m ²	47.3 (\pm 11.5, 27–87)
\geq 1 obesity-related comorbidity, %	81.1
Procedure type, n (%)	
Sleeve gastrectomy	31 (58.5)
Roux-en-Y gastric bypass	14 (26.4)
Duodenal switch	1 (1.9)
Revision	6 (11.3)
Adjustable gastric band removal	1 (1.9)
COVID-19 severity, n (% total)	
Asymptomatic	20 (37.7)
Mild	30 (56.6)
Moderate	2 (3.8)
Severe	1 (1.9)
Preoperative resolution of COVID-19 symptoms, n (%)	52 (98.1)
Preoperative, post-COVID-19 infection, imaging, n (%)	13 (24.5)
Preoperative negative molecular COVID-19 test, n (%)	41 (77.4)
Time from COVID-19 diagnosis to surgery, mean (\pm SD, range), d	82.5 (\pm 63.5, 12–290)
Length of stay, mean (\pm SD, range), d	1.55 (\pm 0.88, 1–4)
Postdischarge DVT prophylaxis, n (%)	12 (22.6)

BMI = body mass index; DVT = deep vein thrombosis.
Thirty-day complications n = 7 (13.2%); 30-day mortality n = 0 (0%).

symptoms prior to elective surgery (other than loss of taste and/or smell). The average length of stay was in line with regular bariatric practice at 1.55 days (range 1–4). Twelve (22.6%) patients were discharged on anticoagulation. There were seven 30-day postoperative complications, including 2 readmissions for abdominal pain, 3 readmissions for dehydration, 1 readmission for ileus, 1 episode of esophageal spasm, and 1 incisional hematoma requiring evacuation. There were no deaths within the study period.

Discussion

This case series of 53 patients who recovered from COVID-19 and underwent bariatric surgery revealed no 30-day mortalities. Morbidity related to cardiovascular, pulmonary, or venous thromboembolism (VTE) complications was also not observed. In general, complication rates of 4% and mortality rates of 0.1% have been found for patients undergoing metabolic and bariatric surgery in the United States [9].

There was variability in terms of preoperative workup for patients after initial COVID-19 diagnosis. The most consistently reported criterion was complete resolution of symptoms (98.1% of patients) before surgery. It stands to reason that patients should be screened immediately before

surgery for the most common symptoms of COVID-19, which include fever, cough, dyspnea, and myalgias/fatigue [1]. Persistent loss of taste and smell occurred in a small number of patients who were otherwise considered symptom free at the time of surgery in this study.

Repeating COVID-19 testing with the goal of a negative molecular test result before surgery occurred 77.4% of the time but was not considered standard of care in all institutions. If surgeons choose to employ this approach, tests should be performed as close to the day of surgery as possible while factoring in turnaround time of testing [10]. With new variants, it is clear that unvaccinated patients who have already had COVID-19 could get it again. Patients should be instructed to self-isolate from the time of testing until surgery. Negative preoperative testing may also be important for operating room workflow and resource allocation—for example, not needing to use designated COVID-19 operating room and recovery space.

Post-COVID-19 recovery chest imaging took place in 24.5% of patients before surgery. This suggests routine chest radiography after recovery from COVID and prior to bariatric surgery may not be necessary in all cases. The benefit would be that if a characteristic pulmonary abnormality is detected, it may be pertinent to postpone surgery and pursue further workup, including pulmonary function testing [11]. Preoperative pulmonology consultation was routinely done in only 9.4% of patients in this study and revealed no abnormalities.

Reports of immune system-mediated COVID-19-induced coagulopathy have been reported in recent literature. These complications have been associated with increased morbidity and mortality in the acute illness phase and for weeks afterward [12,13]. In this series, postdischarge extended VTE prophylaxis was administered in 22.6% of patients. In most cases, VTE prophylaxis was extended beyond the time of hospitalization for an underlying risk factor or disease process but not because of the history of COVID-19 diagnosis specifically [14]. No VTE-related events occurred in this series of patients.

Obesity is the most significant risk factor for mortality in patients under 45 years old who contract COVID-19 [15]. Given evidence that bariatric surgery may be protective, there is no indication that surgery should be delayed [16]. This study shows that in patients with obesity who have survived COVID-19, bariatric surgery is still safe. It is in agreement with a recently published case series including 35 European patients who underwent bariatric surgery after recovery from COVID-19 [17]. Bariatric surgery should not be considered elective in the setting of this pandemic as patients with obesity are at increased risk of mortality and the surgery can be conducted safely both before and after infection.

Limitations of this study include recall bias as the participating surgeons generated included patients from various methods including memory and electronic medical record review. Small sample size makes it difficult to draw accurate conclusions on ongoing needs for the best approach to

preoperative workup in these patients as well as need for extended VTE prophylaxis after surgery. Most patients in this study fell into the asymptomatic or mildly symptomatic categories with initial COVID-19 diagnosis. Complication rates may be different for patients with moderate or severe disease.

Conclusion

Elective bariatric surgery after recovery from COVID-19 in this cohort of patients was not associated with increases in morbidity or mortality rates compared to national averages.

Disclosures

The authors have no commercial associations that might be a conflict of interest in relation to this article.

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