

Chest Computed Tomography for SARS-CoV-2 Screening before Bariatric and Metabolic Surgery during the COVID-19 Pandemic

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Abstract

Introduction: Computed tomography (chest CT scan) may be a valuable preoperative COVID-19 screening method for bariatric and metabolic surgery candidates during this COVID-19 pandemic.

Methods: A descriptive, incidence single-center study was conducted in June 2020. Two study groups were evaluated: surgical team group and bariatric patient group. The COVID-19 Reporting and Data System (CO-RADS) assessment was used as mandatory COVID-19 screening. CO-RADS category 1 and 2 were considered safe to undergo surgery; category ≥ 3 surgery was considered risk for COVID-19 thus canceled. The BMS patient group was monitored for 28 days after surgery for COVID-19.

Results: 240 participants were included, comprising the surgical team (n=6) and the bariatric patient group (n=234). In total, 213 were female (88.8%), median age was 40 years, and the median weight and BMI were 111.1 kg and 40.23 kg/m² respectively. Only CO-RADS 1 was reported in the surgical team group, while in the bariatric patient group, category 1 was reported in 231 participants (98.7%). In the bariatric patient group, during the follow-up period, only two participants (0.83%) tested positive for COVID-19 (RT-PCR), which represents an incidence rate of 0.3% \times 1000 patients.

Conclusion: The use of Chest CT scan for screening was not associated with any case of COVID-19. Chest CT scans can be useful for detecting COVID-19 in bariatric candidates during this pandemic.

Keywords: Metabolic bariatric surgery; Computed tomography (CT); SARS-CoV-2; COVID-19

Introduction

Elective Bariatric and Metabolic Surgery (BMS) has slowed down worldwide. While it has not ground to a complete halt, the number of surgeries has decreased drastically during the COVID-19 pandemic [1]. The inability to maintain an active lifestyle and adhere to lifestyle interventions due to quarantining and lockdowns has provided the perfect conditions for an increase in the global burden of obesity. As it is widely known that one of the most important risk factors for adverse outcomes in COVID-19 is obesity, BMS has become increasingly important and constitutes a priority at this point [2]. From a patient-centered and public health standpoint, it is critical to resume BMS. There is clear evidence that BMS improves survival and significantly improves severe critical obesity-related comorbidities (including

hypertension, type 2 diabetes mellitus, and cerebrovascular disease), which are also known to be severity risk factors for COVID-19 infection [2-4].

The evolution and impact of the COVID-19 pandemic varies greatly from country to country [5]. SARS-CoV-2 will probably circulate in the population for a long time, and the return to normal services, including surgery, will be gradual. Factors that need to be considered to resume BMS include the local prevalence of COVID-19 and the availability of screening tests, health care workers, and resources such as hospital beds, ventilators, and personal protective equipment [2]. However, a delay of months or years in life-saving survival treatment of obesity and its repercussions is not in the best interest of our patients, and the risk and degree of harm from delaying BMS would vary based

on each patient's condition. An early resumption of elective BMS could improve metabolic and immunological conditions in these patients, putting them at lower risk of developing serious complications from COVID-19 and may reduce that risk to the same level as the general population [2,5,6]. While we stress the importance of resuming BMS, we acknowledge it is important to gain a thorough understanding of the limitations of resources in every country, city, and hospital in order to wisely select screening and diagnostic tests suitable for candidates for BMS.

The International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) has recommended standards for patient care during the pandemic, such as vital signs monitoring, Computed Tomography of The Chest (chest CT), and Reverse Transcription Polymerase Chain Reaction (RT-PCR) tests for SARS-CoV-2 [7]. The chest CT scan is considered a cornerstone in the evaluation of this disease [8-12]. Given the risk of severe complications from COVID-19 in patients with obesity, mandatory preoperative screening should be recommended for all patients considering BMS.

In addition to the need to preserve resources for potential COVID-19 patient care and minimize unnecessary COVID-19 exposure. Lei S, et al. [13] and Aminian A, et al. [8] together with the COVID Surg Collaborative, demonstrated an increased risk of mortality (of 20.6%, 75%, and 23.8%, respectively) in patients undergoing general surgery with acute COVID-19 and in patients undergoing general surgery with COVID-19 complicated by severe pulmonary infection [8,13,14]. Therefore, to enable a safe bariatric surgery program, an adequate diagnostic method to identify patients in the acute phase of COVID-19 proves critical [15]. The most commonly used diagnostic test worldwide for COVID-19 is RT-PCR; however, this method has failed to recognize more than 29% of asymptomatic patients [16]. Additionally, the shortage of RT-PCR kits in many countries raises serious concerns for screening patients before surgery [17,18]. However, if the patients are not accurately screened, there is a risk of the health personnel involved contracting SARS-CoV-2 during the preoperative evaluations and surgical procedure. Orotracheal intubation and the surgical use of an electrocautery, ultrasonic device, and laser may be considered risk factors for infecting the surgical team by pneumoperitoneum aerosolization [19-22].

Based on the elevated risk of mortality in patients with the pulmonary form of the COVID-19 infection, the routine use of a chest CT scan prior to elective BMS appears to be a good, acceptable, and valuable COVID-19 screening tool [15,23].

In a recent meta-analysis of chest CT images from 1,115 COVID-19 patients, Wan S, et al. [11] described a pattern of characteristic imaging findings, namely ground-glass opacities and pleural thickening (69%), peripheral distribution (70%), consolidation (70%), air bronchograms (46%), right lower lobe involvement (70%), involvement of more than three lobes (15%), and an irregular paving pattern (15%).

Moreover, other studies have demonstrated that chest CT can be a valuable diagnostic method for patients with suspected COVID-19 because it has a sensitivity of up to 97% [10,11]. A complete understanding of the chest CT patterns and clinical characteristics of patients with COVID-19 can be beneficial for effectively diagnosing and treating patients with COVID-19 when evaluating patients for BMS. However, the classification by means of so-called categories has a great impact on screening [24,25], which, due to the lack of diagnostic tests, is a fundamental pillar in the decision-making process. Therefore, we assessed whether it is possible to safely perform elective BMS during the COVID-19 pandemic without exposing the patient or medical personnel, in an attempt to make a safe return to surgeries.

Methods

Prior to conducting this study, the researchers took into account the recommendations issued by different professional groups such as the IFSO and ASMBS [5-7,26]. These groups considered BMS essential, and therefore the safety goals were met and adequate triage was performed to identify patients with potential COVID-19.

Participant selection

This study was evaluated and approved by the local ethics and research committee of the hospital. Each patient gave written informed consent for their data to be used for research and publication.

This research included two study groups: the team of health care professionals (surgical team group) and the patients scheduled for elective BMS (BMS patient group). The inclusion criteria for the BMS patient group included U.S. national patients scheduled for elective BMS at the Baja Hospital & Medical Center in June 2020. Elimination criteria included patients under 18 years old, BMI <30 kg/m², and chronic diseases that contraindicate the surgical procedure (e.g., lung cancer). Exclusion criteria included patients with a diagnosis of COVID-19, patients with symptoms related to COVID-19 (e.g., fever), and patients with an infectious disease for which BMS was contraindicated or not recommended at that specific time (e.g., community-acquired pneumonia). The group selection schema is shown in figure 1. The surgical team group included the surgeon, the surgeon's surgical assistant, the anesthesiologist, and the surgical nurse and circulating nurses and the same personnel were involved in all surgical procedures. The clinic was all the surgical procedures where performed (Baja Hospital & Medical Center) is exclusively for bariatric and metabolic patients.

Preoperative assessment and COVID-19 screening

Both groups were screened to confirm the absence of COVID-19 prior to surgery; in the surgical team group, COVID-19 status was determined before the study began (May 28th), using chest CT scans and RT-PCR as diagnostic tools. Due to the limitations of RT-PCR and a shortage of RT-PCR kits (which are mainly destined for public hospitals and health care workers), as well as handling and processing difficulties (especially in that period of time in our locality and country), it was not possible to use the RT-PCR as a diagnostic tool in the BMS patient group. However, on the basis of previous good diagnostic performance in asymptomatic individuals [23], chest CT scans were employed as mandatory COVID-19 screening and categorized according to the COVID-19 Reporting and Data System (CO-RADS) (Table 1). Patients classified as category 1 (very low suspicion of COVID-19) and category 2 (low suspicion of COVID-19) were considered safe to perform BMS, and for patients classified as category ≥3 (indeterminate to very high suspicion of COVID-19), BMS was canceled. The chest CT scans were performed preoperatively, one day before surgery or in some cases on the day of surgery (depending on the day of arrival and the scheduled date of surgery).

For the BMS patient group, a preoperative selection algorithm was developed in order to follow a standardized protocol (Figure 2) from the patients' arrival to their admission into the hospital. Additionally, in the BMS patient group, a complete preoperative assessment was performed, including a verification of the COVID-19 self-assessment (Appendix 1) and COVID-19 questionnaire (Appendix 2), a preoperative evaluation by the Internal Medicine Department that included the patient's medical history, a physical examination, and assessment of clinical characteristics (weight, height, BMI, and comorbidities).

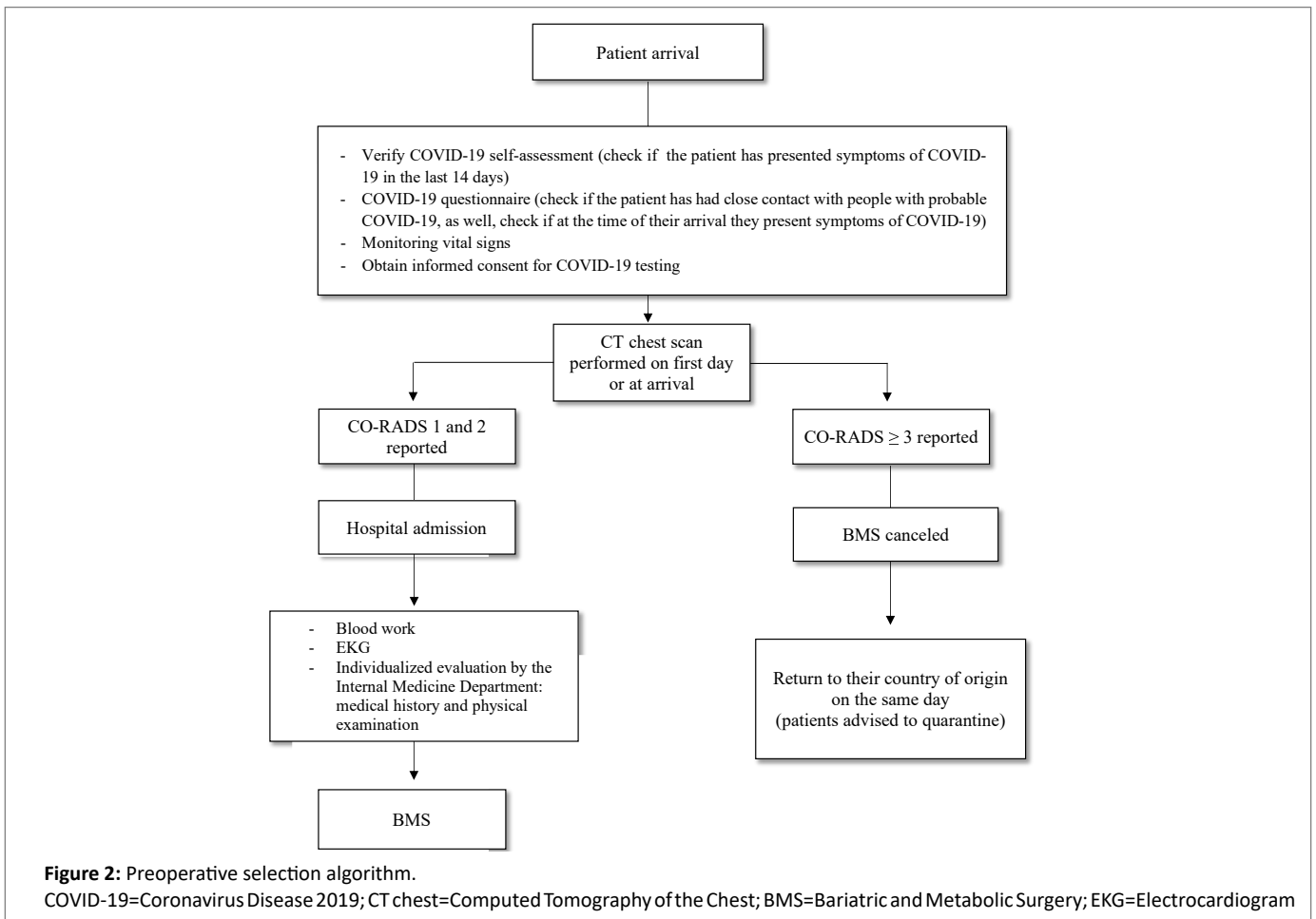
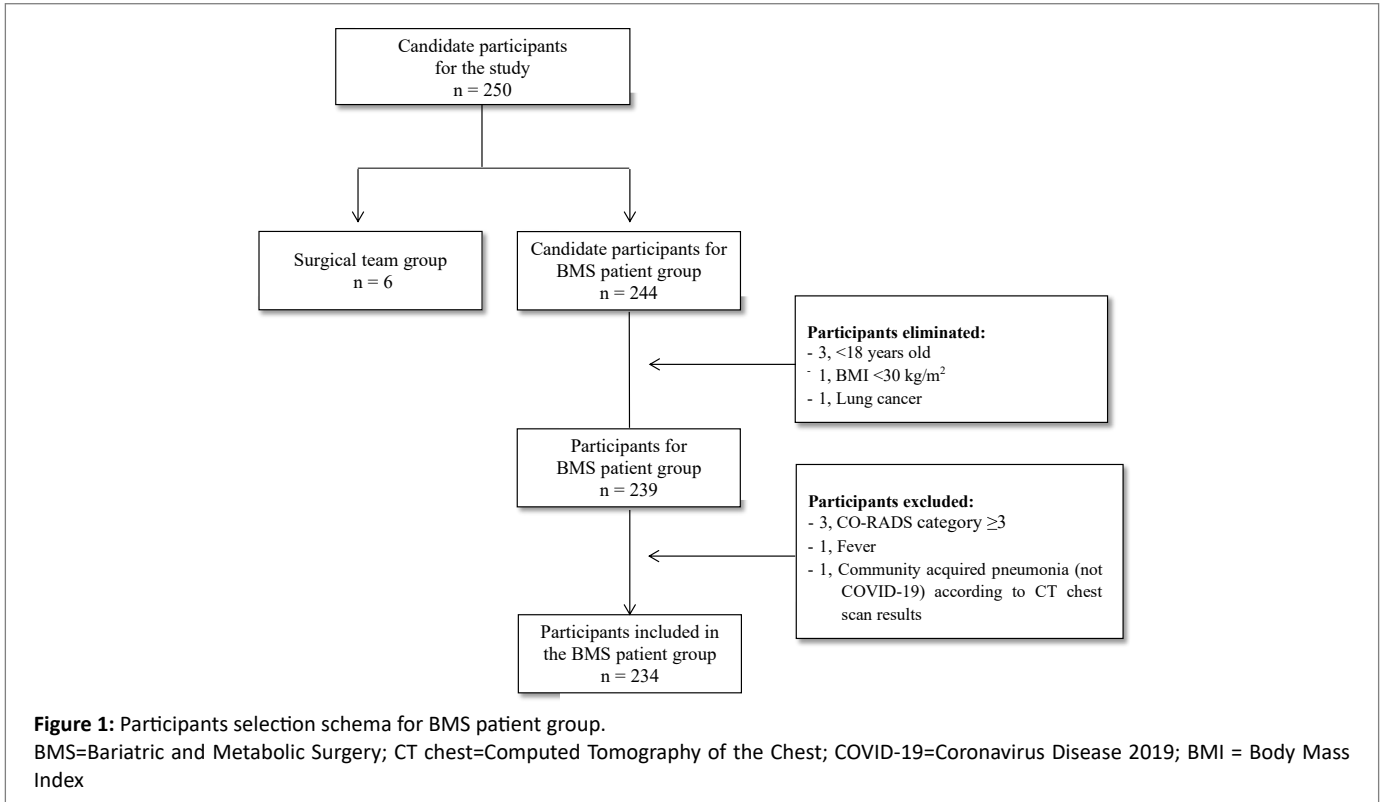


Table 1: Chest CT assessment using the CO-RADS categorical assessment scheme to evaluate suspicion of COVID-19.

Category	Level of COVID-19 Suspicion	Chest CT Findings
CO-RADS 1	Very low	Normal or noninfectious abnormalities
CO-RADS 2	Low	Abnormalities consistent with infections other than COVID-19
CO-RADS 3	Indeterminate	Unclear whether COVID-19 is present
CO-RADS 4	High	Abnormalities suspicious for COVID-19
CO-RADS 5	Very high	Typical COVID-19
CO-RADS 6	Proven	RT-PCR+for SARS-CoV-2

CO-RADS=COVID-19 Reporting and Data System; COVID-19=Coronavirus Disease 2019; RT-PCR=Reverse Transcription Polymerase Chain Reaction; SARS-CoV-2=Severe Acute Respiratory Syndrome Coronavirus 2. Modified from Prokop M, et al. [24].

BMS surgical procedures

Four standardized types of laparoscopic BMS were performed: sleeve gastrectomy (SG), Roux-en-Y gastric bypass (RYGB), one anastomosis gastric bypass (OAGB), and bariatric revisional surgery. Surgery selection was based on the individual needs of each patient. All surgeries were conducted under general anesthesia. The surgical team group wore full protection (surgical equipment, N95 or P100 masks, and face shield, depending on personal preference) during all the procedures.

Follow-up and outcome assessment

In the surgical team group, COVID-19 status was determined by RT-PCR and chest CT scan after the surgical procedures for June were completed (July 3). The BMS patient group was followed up for 28 days after surgery to monitor for COVID-19 (the primary outcome) and the development of postoperative complications, adverse effects, and deaths (secondary outcomes). The postoperative follow-up of this group was performed *via* phone calls by a certified bariatric nurse from the American Society for Metabolic and Bariatric Surgery (ASMBS) on the 14th and 28th postoperative day. The follow-up phone calls consisted in directed questioning to determine the development or presentation of symptoms or signs of COVID-19. If patients reported positive symptoms or signs of COVID-19 in the follow-up period, they were asked to take a RT-PCR test to confirm the presence of the disease. Postoperative complications, adverse effects, and deaths were also assessed by phone calls on the 14th and 28th day after surgery. These calls consisted in a debriefing focused on the most common immediate complications of BMS (e.g., wound problems, pulmonary embolism, leaks, stenosis, internal hernias, port-site hernias, etc.).

Statistical analysis

For the statistical analysis of this study, firstly we analyzed the clinical characteristics, including age, sex, weight, height, BMI, and comorbidities including Hypertension (HTN), Type 2 Diabetes Mellitus (DM2), Obstructive Sleep Apnea Syndrome (OSA), hypothyroidism, dyslipidemia, psychosocial disorders, and others (musculoskeletal disorders, migraine, insomnia, and dermatologic disorders) for the entire sample of participants. Then the sample was divided into groups-the surgical team group and the BMS patient group-for which the clinical characteristics and comorbidities were examined. Subsequently, the participants from the BMS patient group were stratified into subgroups based on the surgical technique

performed (SG, RYGB, OAGB, bariatric revisional surgery), and finally, COVID-19 and postoperative complications during the follow-up period (phone calls on the 14th and 28th day after surgery) were reported. Descriptive statistics were used to evaluate the primary and secondary outcomes.

To ensure the quantitative variables were correctly reported, the data distribution was first verified with the Kolmogorov-Smirnov test; variables are expressed as mean (standard deviation). Nominal and categorical variables are presented as proportions; absolute frequency and percentages were used. As well, for dichotomous variables, Fisher's exact test or X² was used, while for quantitative variables Student's t test of independent samples or ANOVA was used as needed. The incidence rate was calculated by dividing the number of new cases by person-days of the BMS patient group. SPSS version 25 software was used for statistical analysis.

Results

Initially, a sample of 250 participants was selected for the study: six participants for the surgical team group and 244 participants for the BMS patient group. Five participants from the BMS patient group were eliminated: three participants under 18 years old, one with a BMI <30 kg/m², and another who presented diagnosis of lung cancer. This left 239 participants for the BMS patient group; five participants were then eliminated due to exclusion criteria: 3 participants presented CO-RADS category ≥3, one presented fever before surgery, and another was diagnosed with community-acquired pneumonia (not COVID-19) based on the chest CT scan results. A total of 240 participants were included in the final study: six participants for the surgical team group and 234 participants for the BMS patient group. The group selection schema is shown in figure 1.

In total, 213 participants were female, representing 88.8% of the sample, while 27 were male, equivalent to 11.2%; the median age was 40 years, with an Inter Quartile Range (IQR) of 16 years; the median weight was 111.1 kg, with an IQR of 33.4 kg; the mean height was 1.66 m, with an IQR of 0.1 m; and the mean BMI was 40.23 kg/m², with an IQR of 11.6. In the comparison of both groups, there is a statistically significant difference in female sex (p=0.00), weight (p=0.00) and BMI (p=0.00) between both groups. In terms of the CO-RADS classification, only category 1 was reported in the surgical team group (100%). In the BMS patient group, categories 1 (very low suspicion of COVID-19) and 2 (low suspicion of COVID-19) were reported, with an absolute frequency of 231 patients classified as category 1 (98.7%), while only 3 patients were classified as category 2 (1.3%). A summary of the characteristics of each group is shown in table 2.

The BMS patient group was also stratified according to the type of surgical procedure performed: the most common type of procedure was SG, representing 81.6% of the total (n=191), while the least common was the RYGB procedure, with only 2.1% (n=5). Heavier patients were observed in the RYGB group, with a median weight of 134.9 kg and an IQR of 46.4 kg. Comorbidities were observed as follows: HTN 17.6% (n=60), DM2 7.3% (n=25), OSA 5.5% (n=19), hypothyroidism 7.3% (n=25), dyslipidemia 5% (n=17), psychosocial disorders 27.6% (n=94), and others present in 29.4% (n=100). In the comparison of the BMS patient group based on the procedures performed, there is a statistically significant difference in age (p=0.04), female sex (p=0.00), hypothyroidism (p=0.00), and dyslipidemia (p=0.02). A summary of the clinical variables and comorbidities of patients reclassified by surgical technique is shown in table 3.

For the primary outcome, none of the participants in the surgical team group tested positive for COVID-19 (RT-PCR and chest CT

Table 2: Clinical and comorbidities characteristics of the participants in BMS patient group (n=234) and surgical team group (n=6).

Variable	BMS patient group (n=234)	Surgical team group (n=6)	p value
Age	39.9 (9.8)	42.1 (14.4)	0.71 ^{ºº}
Sex**	212 (90.6)	1 (16.7)	0.00 ^º
Weight (kg)*	116.3 (26.1)	77.8 (11.7)	0.00 ^{ºº}
Height (m)*	1.67 (0.8)	1.74 (0.7)	0.05 ^{ºº}
BMI* †	41.5 (8.2)	25.4 (3.0)	0.00 ^{ºº}
Comorbidities			
HTN*** ††	60 (25.6)	1 (16.6)	0.71 ^{ºº}
DM2*** †††	25 (10.7)	1 (16.6)	0.00 ^º
OSA*** ††††	19 (8.1)	0 (0)	0.00 ^{ºº}
Hypothyroidism***	25 (10.7)	0 (0)	0.05 ^{ºº}
Dyslipidemia***	17 (7.3)	0 (0)	0.00 ^{ºº}
Psychosocial disorders***	94 (40.2)	0 (0)	0.71 ^{ºº}
Others***	100 (42.7)	2 (33.3)	0.00 ^º
CO-RADS			
1	231 (89.7)	6 (100)	1.00 ^º
2	3 (1.3)	0 (0)	

*Mean (standard deviation)

** Female (%)

*** Absolute percentage (%)

† BMI=Body mass index

†† HTN=Hypertension

††† DM2=Diabetes mellitus type 2

†††† OSA=Obstructive sleep apnea

º Exact Fisher test

ºº Independent samples student's t test

scan) after performing the surgical procedures. On the other hand, in the BMS patient group, two patients reported symptoms and signs associated with COVID-19 during the follow-up period. RT-PCR was requested and yielded positive results for COVID-19 in these two patients, one at 21 days and the other at 24 days after surgery, which represents an incidence rate of 0.3% × 1000 patients.

Regarding secondary outcomes, five patients (2.1%) reported postoperative complications. Four patients (1.7%) experienced complications during the hospital stay: three patients had postoperative intra peritoneal bleeding (1.2%), and one patient required reoperation due to gastric sleeve obstruction (0.42%). One other patient (0.42%) presented with a late complication 22 days after surgery (gastric sleeve stenosis). During the 28-day follow-up period, no deaths were reported.

Discussion

In our study, we identified three asymptomatic patients with indeterminate to high suspicion of COVID-19 according to the CO-RADS assessment; therefore, these patients did not undergo BMS. During the follow-up period, only two participants (0.83%) reported compatible symptoms and signs of COVID-19. RT-PCR was requested, and they both tested positive for COVID-19 (21 and 24 days after surgery). On the other hand, the surgical team did not

present any positive RT-PCR results on either of the two sampling dates (May 28 and July 3). Therefore, we can report that BMS patients and surgical team members screened as CO-RADS category 1 or 2 on the chest CT scan had a low incidence of COVID-19 after potential exposure (surgery), indicating that the chest CT scan can determine which patients it is safe to perform BMS on.

Postoperative complications were reported in five patients (2.1%). Four (1.7%) had complications reported during their hospital stay (three of whom [1.2%] had postoperative intraperitoneal bleeding), and one patient (0.42%) presented with a complication after hospital discharge that required surgical reintervention due to gastric sleeve stenosis, with symptoms similar to those described by Taube C, et al. [27]. During the 28-day follow-up, there were no deaths reported.

To reduce unnecessary risk of COVID-19 transmission among and between patients and health care personnel in relation to elective procedures, screening for COVID-19 infection with a highly sensitive diagnostic upon admission should be mandatory. RT-PCR is considered the standard test for COVID-19 diagnosis; however, this method has notable limitations, such as a shortage of kits, inadequate lab capability, and problems associated with sample collection and transportation, which can culminate in false negative results in the early stages of the disease [17,18]. Thus, given previous good performance in detecting asymptomatic individuals [21], chest CT scans categorized according to the CO-RADS assessment were used in this study as a cornerstone of preoperative screening. A proposed diagram for preoperative COVID-19 screening in individuals undergoing BMS is presented in figure 2.

In a study conducted by De Smet K, et al. [23] chest CT scans using CO-RADS scoring represented a good diagnostic tool for both symptomatic and asymptomatic patients. Likewise, Shao JM, et al. [15] carried out a systematic review and concluded that CT should be considered for the detection of COVID-19; additional studies have proposed that chest CT should be used even in asymptomatic COVID-19 patients [28] and as a preoperative assessment for all patients [29].

Interestingly, all the studies published so far have reported good, adequate, and safe performance of chest CT scans as a screening tool for symptomatic and asymptomatic COVID-19 individuals. Therefore, we propose that chest CT scans can be used as a COVID-19 diagnostic test to screen patients before they undergo BMS. Prospective randomized controlled studies are required to corroborate these results.

Our study has the following limitations:

- i. COVID-19 prevention efforts through social networks (patient education before arrival about symptoms and signs of COVID-19) meant that symptomatic patients chose not to make the trip for surgery, so fewer cases of COVID-19 were detected on the chest CT scans;
- ii. RT-PCR was not directly compared with chest CT scans;
- iii. The single-center study design made it impossible to observe the reproducibility of this screening approach; and
- iv. Risk of radiation from chest CT scan in young female patients. The radiation doses and association risk of cancer from chest CT scan are generally low and the benefits of using this screening method for COVID-19 in this particularly situation outweigh the risks [30].

Table 3: Clinical and comorbidities characteristics of the participants in the BMS patient group (n=234) stratified by type of surgery.

Variable	Sleeve gastrectomy (n=191)	Roux-en-Y gastric bypass (n=7)	One anastomosis gastric bypass (n=5)	Bariatric revision surgery (n=31)	Total	p value
Age	38 (16)	40 (13)	44 (19)	44 (13)	40 (16)	0.04 ^{ºº}
Sex**	173 (90.6)	6 (85.7)	4 (80)	29 (93.5)	212 (90.6)	0.00 ^º
Weight (kg)*	111.5 (32.3)	111.5 (30.4)	134.9 (46.4)	107 (47.8)	111.5 (31.1)	0.10 ^{ºº}
Height (m)*	1.66 (0.1)	1.62 (0.16)	1.71 (0.23)	1.65 (0.12)	1.66 (0.1)	0.33 ^{ºº}
BMI* †	40.3 (10)	41.5 (12.9)	48.4 (10)	38.2 (12.2)	40.39 (11.5)	0.19 ^{ºº}
Comorbidities						
HTN*** ††	54 (28.3)	0 (0)	2 (40)	4 (12.9)	60 (17.6)	0.07 ^º
DM2*** †††	20 (10.5)	2 (28.6)	2 (40)	1 (3.2)	25 (7.3)	0.06 ^º
OSA*** ††††	16 (8.4)	1 (14.3)	1 (20)	1 (3.2)	19 (5.5)	0.57 ^º
Hypothyroidism***	16 (8.4)	1 (14.3)	3 (60)	5 (16.1)	25 (7.3)	0.00 ^º
Dyslipidemia***	11 (5.8)	0 (0)	2 (40)	4 (12.9)	17 (5)	0.02 ^º
Psychosocial disorders***	75 (39.3)	1 (14.3)	3 (60)	15 (48.4)	94 (27.6)	0.10 ^º
Others***	74 (38.7)	4 (57.1)	3 (60)	19 (61.3)	100 (29.4)	0.13 ^º

*Mean (standard deviation)

** Female (%)

*** Absolute percentage (%)

† BMI=Body mass index

†† HTN=Hypertension

††† DM2=Diabetes mellitus type 2

†††† OSA=Obstructive sleep apnea

º Chi square test

ºº One way ANOVA test

Conclusions

Preoperative chest CT scans to detect COVID-19 proved to be a useful alternative for screening during this COVID-19 pandemic, the use of CT scan for screening in bariatric surgery was not associated with any case of COVID-19, however, in asymptomatic patients, their diagnostic accuracy decreases. Therefore, taking into account the low sensitivity of RT-PCR tests in asymptomatic individuals, as well as the lack of kits and the difficulties of handling and processing in many countries, chest CT scans offer a very valuable tool for preoperative screening. Further prospective randomized controlled studies are warranted to corroborate our results.

Ethical Considerations

This research project was carried out under the ethical precepts indicated in the General Health Law, Regulations on Research for Health, Official Mexican Standard 012 (NOM-012). The data was obtained from the clinical files of the patients undergoing elective surgery during the month of June 2020. The researchers in the group were committed to maintaining the confidentiality of the data in the files and to safeguarding the identities of patients for academic and scientific purposes. Within the scope of this project, a screening protocol was implemented to assess the possibility of bariatric surgery during the COVID-19 pandemic.

Authors Contributions

EOG & MAGG were responsible for the conceptualization of the study and the revision and approval of this manuscript. DEM performed the statistical analysis, and PRC & ORPN drafted the

manuscript and were responsible for its accuracy. ARC critically reviewed the paper. All the authors read and approved the final version of the manuscript.

Funding

We have not received any type of support.

Conflict of Interest

We declare that we have no conflicts of interest.

Availability of Data and Materials

The data are available in the medical records system of the Baja Hospital & Medical Center.

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of Baja Hospital & Medical Center.

Consent for Publication

Each patient gave written informed consent for their data to be used for research and publication.

Competing Interests

The authors declare that they have no competing interests.

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Appendix 1: COVID-19 self-assessment. This questionnaire was sent via email to the patient 14 days before surgery to track possible symptoms and signs of COVID-19.

COVID-19 Self Assessment

To be started 14 days before surgery

Date	Fever of 100.4°F (38°C) or above or possible fever-like symptoms such as alternating chills and sweating?	Morning temperature (°F/°C)	Evening temperature (°F/°C)	Trouble breathing, shortness of breath or severe wheezing?	Unexplained muscle aches?	Cough, sore throat, headache?	Loss of smell or taste?
Day 1							
Day 2							
Day 3							
Day 4							
Day 5							
Day 6							
Day 7							
Day 8							
Day 9							
Day 10							
Day 11							
Day 12							
Day 13							
Day 14 (Travel day)							
Name Printed					Surgery Date		

Appendix 2: COVID-19 questionnaire. This questionnaire was given to the patients upon arrival in order to track possible previous contact with people infected with COVID-19, as well as to identify if they are presenting any current signs or symptoms of COVID-19.

COVID-19 questionnaire

Please fill the box with a "Yes" or "No"

Questions:	Yes	No
Have you traveled or been in contact with anyone who has traveled in the last two months?		
Have you been in contact with anyone with COVID-19 in the last 14 days?		
Do you work in an airport/in health care/as a receptionist or conduct any other work that heavily relies on human contact?		
Fever (100.4°F, 38°C)		
Shortness of breath		
Muscle soreness		
Nausea		
Vomit		
Diarrhea		
Loss of appetite		
Loss of smell		
Irritation in the eye area		
Chronic fatigue		
Nasal congestion		
Headache		
Older than 65 years		
Patient's printed name and signature or legal representative	Date	