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Case Report

COVID-19 Infection Post-Laparoscopic Sleeve Gastrectomy: A Case Report and Review of Literature

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Abstract

Background: COVID-19 caused the suspension of elective surgeries in several hospitals around the world, in an attempt to help contain the spread of the virus. However, a safe resumption of such surgeries is warranted to reduce further burden on patients. It is important to understand when, how and where to resume elective surgeries, as published data suggested that peri-operative COVID-19 infection incurred an increased risk of morbidity and mortality to surgical patients.

Case Report: A 25-year-old patient presented for fever 5 days post Laparoscopic Sleeve Gastrectomy. He was diagnosed with COVID-19 using a PCR test. The patient was managed at home with symptomatic therapy. No life-threatening complications were reported during or after his infection.

Conclusion: Based on available data, our literature review regarding peri-operative COVID-19 complications, bariatric surgeons have to balance between the risk of undergoing an elective surgery like metabolic bariatric surgeries and the risk of postponing this procedure and thus delaying the resolution of obesity along with its comorbidities.

Keywords: COVID-19; Peri-operative; Post-operative; Laparoscopic sleeve gastrectomy; Case report

Background

COVID-19, caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), has spread throughout the world [1], causing hundreds of thousands of casualties. Most hospitals around the globe imposed a moratorium on elective surgeries to avoid peri-operative COVID-19 transmission [2]. Globally, it was predicted that during 12 weeks of peak disruption due to COVID-19, more than 28 million surgeries would be canceled or postponed [3]. Even if hospitals increased their surgical volume by 20%, this backlog would require 45 weeks to be cleared. The impact of a disruption of this magnitude would affect patients' well-being and have financial implications for healthcare providers and hospitals.

COVID-19 was reported to complicate operative outcomes in several studies during the early phase of the pandemic when little was known about the peri-operative effect of infection, which justified the moratorium. Months following the spread of the pandemic, several studies helped understand the complications associated with peri-operative COVID-19 infection, and hence better tailor the resumption of elective surgeries to the given circumstances. Given the risk of COVID-19 as a nosocomial infection, the "First Modified Delphi Consensus Statement for Resuming Bariatric and Metabolic Surgery in the COVID-19 Times" assured that any post-bariatric surgery patient who develops a persistent cough, fever, diarrhea, or vomiting should seek urgent medical care and consider being tested for COVID-19 [4].

In this paper, we report a case of a COVID-19 infection post laparoscopic sleeve gastrectomy (LSG) in Lebanon with a review of literature relevant to peri-operative COVID-19 infection. The case is among the very few reported concerning peri-operative COVID-19 infections in bariatric patients. The patient was successfully treated and did not develop any life-threatening complications.

Case Presentation

A 25-year-old male presented to our clinic complaining of obesity. His past medical history was significant for attention deficit hyperactivity disorder (ADHD) treated with multiple medications, including amphetamine, aripiprazole, and fluoxetine. He had a prior open appendectomy at the age of 13. His family history was positive for lung cancer in addition to several relatives with obesity and obesity-related comorbidities, such as hypertension and hypercholesterolemia.

At the time of presentation, he had failed multiple attempts at managing his obesity with lifestyle modifications such as diet and exercise. He lost 10kg with injectable liraglutide but was far from his ideal weight. His weight and height were 147 kg and 187 cm, respectively, with a corresponding BMI of 42 kg/m^2. Shared decision-making led to him opting for a laparoscopic sleeve gastrectomy.

The patient had a recent travel history from Los Angeles, California, to Beirut, Lebanon, but he had two negative COVID-19 PCR tests and had quarantined after his travel. As part of the preoperative workup, lab work showed a low HDL level (34.4 mg/dL), a low vitamin D level (23.7 ng/mL), and a high ferritin level (335 ng/mL). These results and other lab tests are shown in Table 1. Abdominal ultrasonography showed a grade 3 fatty liver and hepatomegaly with the liver measuring 16 cm at the midclavicular line. An esophagogastroduodenoscopy did not reveal any abnormalities. A PCR test done within 48 hours of surgery was negative.

The patient underwent his laparoscopic sleeve gastrectomy (LSG) without any complications. The duration of surgery was 75 minutes and the estimated blood loss was 20 mL. On postoperative day 1, the patient underwent an upper gastrointestinal series which delineated a patent digestive tract without any leaks. He was discharged on the same day on enoxaparin 40 mg twice daily, rabeprazole, and multivitamins.

Five days after surgery, the patient presented for a routine post-operative visit. He denied any abdominal pain, nausea, or vomiting. He had been having 3 bowel movements per day since being discharged. He also complained of cough, mild neck discomfort, and one episode of fever (38.2˚C) the day before. On physical exam, he was not tachycardic, and his temperature measured 37.5˚C orally. His wounds were clean, and his abdomen was soft and non-tender. He was referred for a PCR test which turned out to be positive for COVID-19. Upon further investigation, none of the hospital staff he encountered had any COVID-19 symptoms, but he had a sibling who tested positive for COVID-19

He was referred to the infectious diseases department for management. Initially, he received symptomatic treatment mainly consisting of antipyretics. However, 6 days later, his cough persisted and his temperature spiked to 39˚C. He had trouble remaining properly hydrated and taking his oral medications. Lab tests were ordered including a complete blood count (CBC), liver function tests, coagulation tests, fibrinogen, D-dimer, and procalcitonin levels. The results are shown in Table 1. Significant findings included a low white blood cell count (WBC at 3x109/L), elevated fibrinogen level (406 mg/dL), and elevated D-dimer level (1249 ng/mL). Chest computed tomography showed bilateral ground-glass opacities (Figure 1).

The patient was managed with skilled home care. His oxygen saturation was monitored every hour and remained above 95% without supplemental oxygenation. IV hydration was administered, along with a course of ceftriaxone and dexamethasone.

Gradual improvement of symptoms ensued, with the temperature returning to normal and abatement of the remaining symptoms. The patient subsequently had 2 negative PCR tests. He was monitored closely for complications such as thrombosis and leak, and he did not develop any.

Table 1: Preoperative and postoperative lab work results. *WBC: White blood count; ALT: alanine transaminase; INR: International normalized ratio; PTT: partial thromboplastin time*

	Pre-op	Day 11	Reference
Hemoglobin (g/dL)	15.6	14.4	*13 - 18*
WBC (count/mm)	8,300	3,000	*4,000 – 12,000*
Platelets (countx10^3/mm)	240	158	*150 - 400*
Ferritin (ng/mL)	335	-	*20 - 250*
ALT (U/L)	35	74	*< 40*
INR	-	1	*≤ 1.1*
PTT (seconds)	-	28	*25 - 35*
Fibrinogen (mg/dL)	-	406	*180 - 350*
D-Dimer (ng/mL)	-	1,249	*0 - 500*
Procalcitonin (ng/mL)	-	0.15	*≤ 0.15*

Discussion

Our case in light of published data

Peri-operative COVID-19 infection has been the topic of interest of many surgeons to weigh the risks and benefits of resuming elective surgeries and to the preparation for possible additional complications of emergency surgeries during COVID-19 times. A recent multi-center international collaborative study including more than 140,000 surgical patients showed the importance of postponing surgery in case of COVID-19 infection. 2.2% of the patients recruited had a pre-operative SARS-CoV-2 infection. The postoperative mortality risk in this group was higher compared to those without a previous similar infection. It is important to note that the mortality risk was inversely proportional to the duration

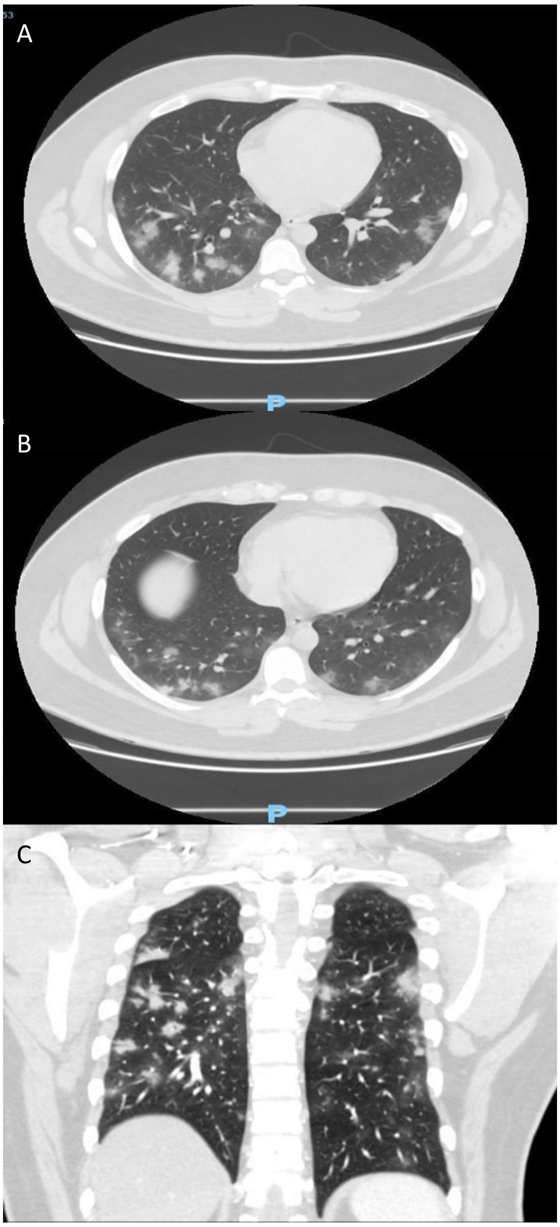

Figure 1: *(A-B)* Axial cuts from chest computed tomography showing bilateral ground-glass opacities, more pronounced in the dependent areas of the lungs. *(C)* Coronal cut detailing the extent of lung involvement.

between COVID-19 diagnosis and surgery, with an odds ratio of 4.1 in patients submitting to surgery within 0 to 2 weeks of diagnosis, 3.9 in those within 3 to 4 weeks, and 3.6 in those within 5 to 6 weeks, all within a confidence interval of 95%. However, surgery postponed for at least 7 weeks post-infection was associated with a mortality risk comparable to that of the baseline without infection, with an odds ratio of 1.5 [5].

A previous study by the same collaborative tackled the complications of surgical COVID-19 patients and included 1128 patients. The diagnosis was made pre-operatively in 26.1% of the patients, and post-operatively in 71.5%. 30-day mortality was 23.8%, with no deaths among patients below 30 years of age. 51.2% of the patients developed pulmonary complications, the most common being pneumonia at 40.4%. Pulmonary complications were associated with higher mortality rate (38% versus 8.7%). The highest mortality rate was reported at 43.1% in the group of patients who presented for an emergency surgery followed by a post-operative SARS-CoV-2 infection with pulmonary complications [6]. In the described case, our patient had a post-operative COVID-19 infection, similar to the majority of the cases in the aforementioned study. He developed pneumonia, the most common pulmonary complication, putting him in a group with a mortality rate of 28.3% (elective surgery followed by post-operative SARS-CoV-2 diagnosis with pulmonary complications). However, in his age group, the 30-day mortality was null [6].

An Italian study showed that, compared to the control group, surgical patients with COVID-19 had a higher risk of sepsis (9.76% vs 7.32%) and septic shock (7.32% vs 0%). They were also more likely to be ventilator-dependent (7.32% vs 0%). While none of the COVID-19-free patients developed thrombotic complications, 9.76% of the infected group experienced such events. Interestingly, CRP and fibrinogen levels were both more elevated in the COVID-19 group [7]. Of note, our patient did not develop any sepsis or thromboembolic events. Similarly, he did not require any respiratory support. His serum fibrinogen was elevated at 406 mg/dL.

Our patient's symptoms did not require intensive care unit (ICU) admission, as they were managed symptomatically. A study published during the early phase of the pandemic revealed that COVID-19 with mild or no symptoms did not impact the postoperative outcomes [8]. On the contrary, another study showed that 44% of COVID-19 surgical patients were admitted to the ICU due to deterioration in organ function and the need for mechanical ventilation. ICU patients were older (55 years versus 47 years) with more comorbidities (80% versus 42.1%), and a shorter average duration from the first symptom to dyspnea (2 days versus 5 days). They had a higher risk of developing acute respiratory distress syndrome (ARDS) (60.0% versus 32.4%), shock (53.3% versus 29.4%), secondary infarction (46.7% versus 29.4%), and acute cardiac injury (33.3% versus 14.7%). 46.7% of the ICU group died versus 20.6% of the control. Mortality was higher than the reported overall case-fatality rate of non-surgical COVID-19 patients (2.3%) and that of COVID-19-free non-cardiac surgical patients who were admitted to the ICU (7.9%) [9, 10].

A small French study described the accuracy of chest CT scan in diagnosing COVID-19 in post-operative patients to be 100%. COVID-19 infection post-operatively was associated with a longer hospital stay (20 +/- 11 days vs 13.3 +/- 7 days) [11]. Our patient's chest CT scan depicted a ground-glass appearance, the most common presentation of a COVID-19 infection. However, this study failed to show increased mortality among the COVID-19 group, the researchers attribute this finding to the fact that, unintentionally, surgical COVID-19 patients included in the study were younger (47 +/- 15 years old) than the surgical non-COVID-19 patients in the control group (65 +/- 14 years old) [11].

Metabolic bariatric surgery (MBS) and peri-operative COVID-19

MBS is known to be a safe procedure that does not require a long hospital stay [12]. However, it is an elective surgery that can be postponed. Patients can contract SARS-CoV-2 as a nosocomial infection peri-operatively or during any of the subsequent follow-up visits. A case series of 4 Iranian patients who developed COVID-19 infection post metabolic bariatric surgery (MBS) was published earlier during the pandemic [13]. Three out of the 4 patients had Roux-en-Y gastric bypass, while one had single-anastomosis gastric bypass. The average BMI was 49 +/- 3 kg/m2, and the average age was 46 +/- 12 years. One patient did notice anosmia 2 days pre-operatively, but the other symptoms developed between 1 and 14 days postoperatively. They all received hydroxychloroquine and 2 were admitted to the ICU where they received off-label antiretroviral therapy made of a combination of lopinavir and ritonavir, along with tocilizumab and hemoperfusion to decrease cytokines during a cytokine storm. None of the patients required mechanical ventilation and they all survived [12]. Our patient had a different operation (LSG), is younger (25 years of age), and with a lower BMI. He contracted COVID-19 post-operatively and received a different treatment regimen given that the recommendations regarding COVID-19 treatment are in continuous change.

Postponing or canceling MBS led to a delayed resolution of obesity along with its comorbidities [4], including obstructive sleep apnea (OSA) and obesity hypoventilation syndrome (OHS) which can increase the risk of developing pulmonary complications of COVID-19. Obesity itself was an independent risk factor for mortality in H1N1 patients [14]. Similarly, influenza A shedding duration in patients with obesity was 1.42 times that in those without obesity [15]. Regarding the pandemic, a study showed that 88.2% of the non-survivors had a BMI above 25 kg/m2 versus 18.9% of COVID-19 survivals [16].

Resumption of MBS

Resuming MBS procedures under safe circumstances is needed for medical, psychological, and financial reasons. Some patients require expedited access to MBS, including those with HbA1c above 8%, albuminuria or chronic kidney disease stage 3 or 4, non-alcoholic steatohepatitis, history of cardiovascular disease, severe obstructive sleep apnea (OSA) or obesity hypoventilation syndrome (OHS), heart failure AHA stage C, and patients with more than 2 metabolic conditions increasing the cardiovascular risk, other than type 2 diabetes [17]. Thus, triaging patients is warranted. Authors agree that procedures should be performed in a hospital or a hospital wing free of COVID-19 patients [4]. Admitting an asymptomatic COVID-19 patient for an elective procedure impacts the overall surgical outcome and increases the risk of SARS-CoV-2 hospital transmission, whether to healthcare workers or other patients [18], which justifies routine PCR testing pre-operatively. Multidisciplinary optimization of patients' comorbidities should be insured prior to surgery, and the duration of pre-MBS hospitalization should be minimized [4].

Post-operatively, the medical team should maintain a high index of suspicion for COVID-19 infection if patients develop suggestive symptoms [4]. Chest CT scan can be the most helpful tool for initial diagnosis. In light of gastrointestinal symptoms reported in 45% of patients admitted to the hospital with severe COVID-19 infection [19], one study not only supported the use of chest CT scan for rapid diagnosis of SARS-CoV-2 infection in the post-operative period, but also recommended the routine addition of chest CT scan to any abdominal CT scan for abdominal post-operative symptoms [11].

COVID-19 infection may increase the risk of thrombotic events [20]. In addition, surgery itself is a risk factor for thromboembolism, thus prophylaxis is required within the first 24 hours post-operatively, either by means of sequential compression devices, subcutaneous unfractionated heparin, or low-molecular-weight heparin [21]. Prophylaxis should be extended in the high-risk group, which may include patients with an active COVID-19 infection. Additional supportive treatment with oxygen and fluids is warranted [22]. Other treatment protocols are similar to non-surgical patients, with acetaminophen as the antipyretic drug preferred. If hypoxia develops and the patient is still not on oxygen supplementation, remdesivir is preferred over dexamethasone. However, a combination of these 2 drugs can be given to patients on low-flow oxygen supplementation. In case of increased oxygen needs along with high inflammatory markers including C-reactive protein (CRP above 75 mg/L), adding tocilizumab to the regimen can be of value, based on a case-by-case consideration. Other treatments are not suggested, including hydroxychloroquine, chloroquine, lopinavir, and ritonavir [23].

Patients with a history of MBS performed months or even years ago should receive special care. COVID-19 infection in this population necessitates the adjustment of medication dosing in light of decreased absorption of the oral formulas. Thus, the recommended route of administration is intravenous. However, for oral medications, liquid formulas are preferred over solid formulas, and the maximal dose should be given to avoid treatment failure [24].

Strengths and limitations

This is the first case report of a COVID-19 infection after LSG. The patient was well-managed without serious complications. However, this is a single case and larger case series and studies should be conducted to ascertain strategies applied in such cases. The patient represents a single sample of his population, given his health status and young age.

Conclusion

In this article, we present a case report of a post-LSG COVID-19 infection complicated with pneumonia. Given the data available, we have to balance between the risk of undergoing an elective surgery like MBS and the risk of postponing this procedure along with the delay in the treatment of obesity and its comorbidities. Surgeons should keep a high index of suspicion for post-operative COVID-19 infection in patients who develop respiratory and/or gastrointestinal symptoms, and special care should be offered for infected patients with a history of MBS.

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