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Is Surgery a Risk in Recovered COVID-19 Patients?

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Abstract

Objective: Preoperative evaluation and operation timing have always been a critical aspect of safe surgical practice, and in the midst of the SARS-CoV-2 pandemic, it has become even more crucial to patient safety. The aim of this study is to examine the reliability and results of surgery in recovered COVID-19 patients.

Methods: Patients who recovered after COVID-19 infection and who underwent surgery between June 2020 and January 2021 were included in the study. Demographic data of patients, comorbidities, symptoms of COVID-19, time from diagnosis of COVID-19 to surgery (weeks), type of surgery (major/minor), hospitalization time, and postoperative complications were examined.

Results: Of the 70 patients, 36 were female and 34 were male. The mean age was 53.7. The number of cases who had asymptomatic and symptomatic COVID-19 infection was 23 and 47, respectively. The interval between infection and surgery was an average of 10.2 (range, 2-31) weeks. The number of major and minor surgical procedures was 54 and 16, respectively. The average hospitalization time was 2.38 days, and 30-day mortality was 1.4%. According to the Clavien–Dindo classification, 61.4% of patients did not develop postoperative complications. There was no significant difference in hospitalization time, Clavien–Dindo score, and mortality between patient groups that had symptomatic and asymptomatic infection ($P > .05$). There was also no statistically significant correlation between COVID-19 positive diagnosis and postoperative complications, Clavien–Dindo score, and mortality ($P > .05$).

Conclusion: Surgical procedures can be performed safely in recovered COVID-19 patients who do not have symptoms during the time of surgery.

Keywords: SARS-CoV-2, general surgery, postoperative outcomes

In December 2019, an outbreak of the novel coronavirus disease (COVID-19) caused by the SARS Coronavirus 2 (SARS-CoV-2) occurred in Wuhan, China.[1,2] It spread rapidly to other areas in China and worldwide.[3,4] The COVID-19 pandemic has caused massive disruptions to routine hospital services worldwide. During the pandemic, hospitals reduced and delayed elective surgery for patient safety.[5,6] Even when patients with COVID-19 have recovered, they are reluctant to undergo surgery, fearing that the effects of this disease may last a long time and pose a risk to the surgery.

We know that patients who undergone surgery with active COVID-19 infection had experienced significantly worse postoperative results. Postoperative 30-day mortality is between 19% and 24%, with most patients having postoperative pulmonary complications.[7-9] But the timeline for recovered COVID-19 patients remains nebulous, and there are very limited data in the literature for the postoperative results and operation timing of recovered COVID-19 patients. However, clinical guidelines support postponing non-emergency surgery for patients with preoperative SARS-CoV-2 infection, but specific recommendations are conflicting, recommending delays ranging from 1 to 12 weeks.[10] More granular data are needed urgently to inform clinical practice, especially regarding the significance of symptomatic vs. asymptomatic preoperative SARS-CoV-2 infection.

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This study aims to evaluate the surgical reliability and postoperative results of recovered COVID-19 patients and to investigate whether surgery poses a risk in patients who have recovered from COVID-19.

Methods

Design and setting

This prospective clinical trial includes 70 patients who underwent surgery in our clinic between June 2020 and January 2021 after having recovered from a SARS-CoV-2 infection. Kartal Dr. Lütfi Kırdar City Hospital Ethics Committee approval was obtained for the study (Date: December 30, 2020, Number: 514/192/48). The sample size was calculated as 70 for an effect size for ANOVA: 0.6, and alpha: 0.05, and power: 0.80, using GPower 3.1 program. An informed voluntary consent certificate was obtained from each patient who agreed to participate in the study.

Study participants

We defined positive SARS-CoV-2 infected patients as those who have been tested positive using real-time polymerase chain reaction (RT-PCR). We defined recovery as having two negative RT-PCR tests for SARS-CoV-2 before surgery or one negative test not more than 48 h before surgery, and no symptoms during surgery after having had a previous positive RT-PCR test. Patients who have been diagnosed with SARS-CoV-2 infection and those who underwent surgery in our clinic were included in the study after their recovery. Patients who had a positive RT-PCR test before surgery, patients who had COVID-19 symptoms even though the RT-PCR test was negative, and patients under the age of 18 were excluded from the study.

Covariables

Demographic data of patients, baseline comorbidities, COVID-19 presentations (symptomatic/asymptomatic), time from diagnosis of COVID-19 to surgery (weeks), type of surgery, urgency of surgery, hospitalization time in hospital and in the intensive care unit (ICU), postoperative complications, Clavien–Dindo complication grade scores, and mortality rates were recorded.

Outcomes

The primary result was to evaluate the results of surgery in recovered COVID-19 patients and to determine a risk group for surgeons by comparing hospitalization time, postoperative complications, and mortality parameters of those who have symptomatic or asymptomatic disease. The secondary result is to evaluate whether there is a relationship between the time from COVID-19 diagnosis to surgery and postoperative outcomes, thus determining when recovered COVID-19 patients can undergo surgery.

Data measurement

Major surgery was defined as any intra-abdominal surgeries and surgeries with the potential for significant complications (such as gastrectomy, colorectal resections, laparoscopic cholecystectomy, etc.).[11] Minor surgery was defined as surgical interventions with a low risk of complications (such as pilonidal sinus excision, repair of inguinal herniations).[11] Emergency surgery was defined as surgeries that need to be performed by surgeons within 24 h. Survival was defined as survival on the 30th day after surgery. Postoperative complications were scored according to Clavien–Dindo classification.[7]

Statistical analyses

Statistical analyses were carried out with the help of the Statistical Package for the Social Sciences software 17.0 (IBM Inc, Chicago, IL, USA). The suitability of the variables to the normal distribution was examined with histogram graphs and the Kolmogorov–Smirnov test. Average, S.D., and median values were used when presenting descriptive analyses. Categorical variables were compared with Pearson's Chi-square test. Mann–Whitney *U*-Test was used when evaluating nonparametric variables that did not show normal distribution between two groups. Spearman correlation test was used in the analysis of data. $P < .05$ was considered a statistically significant result.

Results

Out of 70 cases, 36 were female, 34 were male, and the average age was 53.7 years (30-75). The most common comorbidities were hypertension (HT) at 34.2%, diabetes mellitus (DM) at 25.7%, and chronic obstructive pulmonary disease (COPD) at 17.1%, respectively. Demographic data of patients are shown in Table 1.

While 32.8% (n = 23) of the cases had asymptomatic COVID-19 infection, 67.1% (n = 47) had symptoms. The mean time between the diagnosis of SARS-CoV-2 (+) and surgery was 10.2 weeks (range, 2-31).

Of the surgeries, 54 (77.1%) were major and 16 (22.8%) were minor surgical procedures. Laparoscopic cholecystectomy (40%) was the most performed surgical procedure. This was followed by repair of inguinal hernia, colorectal and gastric surgery, respectively (Table 2). Major surgeries in the symptomatic group (n = 40): 24 patients underwent laparoscopic cholecystectomy, 4 patients colorectal resections, 2 patients total gastrectomy, 3 patients breast surgery, 3 patients total thyroidectomy, 1 patient subtotal gastrectomy, 1 patient liver metastasectomy, 1 patient

Table 1. Demographic Characteristics of Patients

	n (%)
Age*	53.7 (30-75)
Gender (male/female)	36/34 (51.4/48.5)
Comorbidities	
Hypertension	24 (34.2)
Diabetes mellitus	18 (25.7)
COPD	12 (17.1)
Other comorbidities**	28 (25.7)
ASA scores	
ASA 1	23 (32.8)
ASA 2	36 (51.4)
ASA 3	11 (15.7)

*Mean; **Coronary artery disease, congestive heart failure, idiopathic thrombocytopenic purpura, obstructive sleep apnea syndrome, tuberculosis. COPD, chronic obstructive pulmonary disease; ASA, American Society of Anesthesiologists.

Table 2. Surgical Characteristics of Patients

	n (%)
Major/minor surgical procedure	54/16 (77.1/22.8)
Emergency/elective surgeries	6/64 (8.5/91.4)
Surgeries performed	
Laparoscopic cholecystectomy[a]	28 (40)
Repair of inguinal herniation[b]	12 (17.1)
Colorectal resection[a]	6 (8.5)
Total gastrectomy[a]	4 (5.7)
Subtotal gastrectomy[a]	2 (2.8)
Total thyroidectomy[a]	5 (7.1)
Breast surgery*,[a]	4 (5.7)
Unilateral adrenalectomy[a]	2 (2.8)
Liver metastasectomy[a]	1 (1.4)
Appendectomy[a]	2 (2.8)
Pilonidal sinus excision[b]	2 (2.8)
Perianal fistulotomy[b]	2 (2.8)
Hospitalization time (days)**	2.38 (1-10)
Length of stay in ICU (days)**	2.22 (1-5)

*Mastectomy, breast protective surgery + sentinel lymph node biopsy, modified radical mastectomy; **Mean; [a]Major surgery; [b]Minor surgery; ICU, intensive care unit.

unilateral adrenalectomy, and 1 patient appendectomy. Major surgical procedures performed in the asymptomatic group were (n = 14) laparoscopic cholecystectomy in 4 patients, colorectal resection in 2 patients, total gastrectomy in 2 patients, total thyroidectomy in 2 patients, subtotal gastrectomy in 1 patient, breast surgery in 1 patient, appendectomy in 1 patient, and unilateral adrenalectomy in 1 patient.

The vast majority of the surgeries (n = 60, 85.7%) were performed under general anesthesia. The average hospitalization time of all patients was 2.52 ± 2.35 (range, 1-18) days. The mean duration of hospitalization in ICU was 2.33 ± 1.65 (range, 1-6) days.

Wound infection was observed in 3 of the cases, paralytic ileus in 1, and deep vein thrombosis in 1. The 30-day mortality rate was 1.42% (n = 1). The patient who was lost had previously been hospitalized in the ICU due to COVID-19 and had a total gastrectomy due to gastric cancer 7 weeks after receiving treatment. Although prophylactic low molecular weight heparin was applied to this patient, widespread deep vein thrombosis developed on postoperative day 3 . According to the Clavien–Dindo classification, grade I complications were observed in 20 of the cases, grade II in 6, and grade V in 1 (Table 3).

There was no significant difference in surgical procedure (major/minor), hospitalization time, complications, Clavien–Dindo score, and mortality among patients who had symptomatic and asymptomatic COVID-19 infection ($P > .05$, Table 4). There was also no statistically significant correlation between COVID-19 positive diagnosis and postoperative complications, Clavien–Dindo score, and mortality ($P > .05$).

Discussion

During the pandemic, surgical services at hospitals were interrupted by the postponement of elective surgeries. Reduction in surgical activity (elective and urgent) was observed globally during the SARS-CoV-2 pandemic.[12] It is believed that it will take a long time to clean up the accumulated workload,[6,8] even if countries increase their normal surgical capacities by 20% after the pandemic. Considering the systemic findings of COVID-19, parallels about clinical recovery are traced from the current literature as information on the recovery period and the timing before the transition to elective surgery is limited.[9] For example, the recommended waiting time after myocardial infarction is 8 weeks,[13] and stroke continues to decrease significantly up to 9 months.[14] In a study examining postoperative complications in patients who had fever requiring medical treatment in the month before surgery, respiratory complications were more likely to be observed.[15] Similarly, since preoperative pneumonia increases postoperative morbidity and mortality, it is recommended elective surgery be postponed until the patient fully recovers from pneumonia.[16] We hope that our one-centered study, in which we examine the postoperative results of recovered COVID-19 patients, will contribute to the literature, especially during the return to the "new normal" after the pandemic.

Table 3. Postoperative Outcomes of the Patients

	n (%)
Postoperative complications	
Wound site infection	3 (4.2)
Deep vein thrombosis	1 (1.4)
Paralytic ileus	1 (1.4)
Clavien–Dindo classification	
None	43 (61.4)
I	20 (28.5)
II	6 (8.5)
III (a-b)	-
IV (a-b)	-
V	1 (1.4)
Mortality	1 (1.4)

In the literature, a few studies show the potential for high morbidity and mortality in patients who have undergone surgery while testing postitve for COVID-19.[17,18] In Canada, high rates of postoperative pulmonary complications (25%) and mortality (15.9%) were found in COVID-19(+) patients; in a study that examined the postoperative results of 44 COVID-19 positive patients, 18 suspected COVID-19 positive patients, and 18 patients having recovered from COVID-19. In the same study, mortality was higher (23.1%) in patients with symptomatic infection, while complication rates were lower in recovered COVID-19 patients.[19] In another study which examined the data of 34 patients who underwent elective surgery during the incubation period of COVID-19, 15 (44.1%) patients were followed up in the intensive care unit due to postoperative pneumonia, and mortality was observed in 5 (20.5%) patients.[20] A cohort study involving 41 surgical patients with COVID-19 and 82 non-COVID-19 patients has shown that early mortality rates and complications, pneumonia, and thrombotic complications are significantly associated with COVID-19.[21] Therefore, surgeons need up-to-date data on the timing of the operation of patients who were COVID-positive previously and have recovered. In an international prospective cohort study, it was suggested that where possible, surgery should be delayed for at least 7 weeks following SARS-CoV-2 infection.[10] In another study, the authors suggested a minimum recovery time of 4 weeks for patients who had an asymptomatic SARS-CoV-2 infection, and 6-8 weeks for symptomatic patients, acknowledging that there are currently little data on the timeframe of recovery.[9]

The incidence of postoperative complications in the patients in our study was similar to the results of patients in the literature who never had COVID-19. The recovered patients were operated on at the earliest of 2 weeks and the latest after 31 weeks, and no difference was found between the waiting time and postoperative complications. In addition, the effect of symptomatic or asymptomatic disease on postoperative hospitalization time, complications, and mortality could not be determined. Previous studies support the recommendation to postpone surgery, if possible, in COVID-19 patients.[22-24] As a result of the data of our study, we recommend that recovered COVID-19 patients who have received negative PCR test report and have no symptoms prior to the operation can also undergo surgery safely.

The limitations of our study include single-centeredness and a low number of samples. The heterogenity of the surgical procedures of the patients in the present study was another important limitation. In addition, the post-COVID symptoms of the patients were not evaluated in the present study. Only COVID symptoms and PCR test results were taken as criteria.

Table 4. Comparison of Postoperative Outcomes of Patients Who Had Symptomatic and Asymptomatic COVID-19 Infection

	Symptomatic Group		Asymptomatic Group		*P*
Age	54.79 ± 14.80	57,00	51.57 ± 10.52	53,00	.181[a]
Gender					
Male	21	(45,24)	10	(40,91)	.740[b]
Woman	25	(54,76)	14	(59,09)	
Surgical procedure (major/minor)	40/10	(80/20)	14/6	(70/30)	.366[b]
Hospitalization time (days)	2.43 ± 2.35	1,00	2.30 ± 2.40	1,00	.564[a]
Postoperative complications	4	(8,51)	1	(4,35)	.496[b]
Clavien–Dindo score	0.77 ± 0.91	1,00	0.57 ± 0.66	0,00	.417[a]
Mortality	1	(2.13)	0	(0.00)	.481[b]

[a]Mann–Whitney *U*-test (Average ± S.D. and median given); [b]Chi-square test (n and % given).

We observed that postoperative complications and mortality rates in recovered COVID-19 patients are within acceptable limits and that surgical procedures should not be postponed in this patient group. In addition, in our study, we found similar postoperative results between symptomatic and asymptomatic groups. No association was found between the time from COVID-19 positive diagnosis to surgery and postoperative complications. We believe that our results will contribute to the literature on the return to normalcy with reference to surgery. More precise results will be needed on this subject with high patient numbers and multicenter studies.

Ethics Committee Approval: Ethics committee approval was received for this study from Kartal Dr Lutfi Kırdar City Hospital Ethics Committee (Date: December 30, 2020, Number: 514/192/48).

Informed Consent: An informed voluntary consent certificate was obtained from each patient who agreed to participate in the study.

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