The Effects of Nasocomial SARS-CoV-2 Infection after Elective Gastrointestinal Oncologic Procedures: Single Center 30-day Follow-up Results

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Abstract: Although there is extensive debate for the best treatment strategies, limited studies, which reflect the effects of postoperative severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection on mortality and hospital stay after elective gastrointestinal oncologic procedures were published. In order to contribute to the existing literature, a single-center, retrospective, cross-sectional study, including 301 patients who underwent elective gastrointestinal oncological procedures was planned. Patients' data on sex, age, diagnosis, types of procedures, hospital stay, mortality, and SARS-CoV-2 preoperative screening tests were recorded. Four of them were postponed due to positive preoperative screening for SARS-CoV-2. 395 procedures were performed due to cancer originating from colon (105), rectum (91), stomach (74), periampullar region (16), distal pancreas (4), esophagus (3), retroperitoneum (2), ovary (2), endometrium (1), spleen (1) and small bowel (2). Laparoscopy was the approach of choice for 44 patients (14.7% vs. 85.3%). In the postoperative period, two patients were infected with SARS-CoV-2 and one of them died in the intensive care unit (n=1/2, 50% mortality). Two patients died due to surgical complications unrelated to SARS-CoV-2 (n=2/299, 0.67% mortality) ($p<0.01$). The mean hospital stay was longer in patients with SARS-CoV-2

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infection (21.5 ± 9.1 – 8.2 ± 5.2 days, respectively, p<0.01). 298 patients were safely discharged (99%). During the pandemic elective gastrointestinal oncologic procedures may be safely performed; however, preoperative testing, precautions to minimize contamination should be performed strictly to reduce in-hospital infection rates, since the mortality rate due to SARS-CoV-2 in this setting is particularly high and hospital stay is also significantly increased.

Introduction

The World Health Organization declared SARS-CoV-2 infection as a pandemic on March 11, 2020. On the same day, the Turkish Ministry of Health reported the first case in Turkey (Turkish Ministry of Health, 2021). The initial wave of the COVID-19 pandemic had a global impact on the provision of cancer care. The need to divert resources to the pandemic response forced many countries to cancel elective operations (Richards et al., 2020). This has a manifest in postponement of and alterations to standard therapy, cessation of screening programmes (Tan and Lau, 2020). As in the World (Carrano et al., 2020; Iacobucci, 2020) all health services in our country have undergone radical changes that have led to the suspension of many elective surgeries. Patients with underlying malignancies and advanced ages are at higher risk of getting more serious illness when infected with SARS-CoV-2 (Dai et al., 2020). Therewithal, not receiving regular treatment for cancer increases the risk of cancer-related morbidity, complications, and mortality (Yang et al., 2020). Due to the surgery's pro-inflammatory nature and its associated immunosuppressive response patients undergoing surgery have a greater risk of becoming infected with COVID-19 (Besnier et al., 2020; Huang et al., 2020). According to the international collaborative group COVIDSurg's available data on complications in patients undergoing surgery during this pandemic the 30-day mortality rate was 23.8% (COVIDSurg Collaborative, 2020). Other series have also shown high mortality rates between 20 and 25% (Doglietto et al., 2020; Lei et al., 2020; Luong-Nguyen et al., 2020).

Although there is extensive debate for the best treatment strategies, limited data on elective gastrointestinal oncologic procedures' results have been published. We aimed to present the perioperative surgical approach and 30 days follow-up outcomes of patients who underwent elective gastrointestinal oncological procedures to reflect the effect of postoperative SARS-CoV-2 infection on mortality and hospital stay and contribute to the existing literature.

Material and Methods

This study was conducted in accordance with the 1983 Helsinki Declaration, approved by the Turkish Ministry of Health Science Committee and the hospital's ethical committee for clinical studies (GOKA/2021/19/7). Written informed consent was obtained from all patients concerning the risks associated with the relevant surgeries, as well as COVID-19 infection.

This was a retrospective, cross-sectional and single-center study. Data from patients who underwent gastrointestinal oncological procedures were retrospectively reviewed from the surgical database collected from a single tertiary hospital.

All adult patients of both sexes, who underwent elective surgery between April 2020 and November 2021 were included in this study. Patients undergoing emergency surgery for cancer-related gastrointestinal system complications, such as obstruction, bleeding, and perforation, and patients with unresectable metastatic disease were excluded.

Every patient scheduled for surgery screened for SARS-CoV-2 infection with polymerase chain reaction (PCR) tests using nasopharyngeal swab and/or chest computed tomography (CT). Patients with at least one positive result (chest CT or nasal swab) had their surgery postponed and were treated according to their symptoms and severity of the disease. Patients with negative result underwent surgery. Postoperative SARS-CoV-2 test was not routinely performed unless acute infection was suspected.

Patient data on sex, age, indication of surgery, diagnosis, types of procedures, hospital stay, mortality, and SARS-CoV-2 screen test results were recorded. Hospital stay was defined as the time elapsed from hospitalization to discharge. After the surgical procedure, patients were clinically monitored during the entire postoperative hospital stay, and if SARS-CoV-2 infection was suspected, chest CT was performed, and nasal swab PCR were collected. Many precautions have been taken to minimize contamination between staff and patients during the hospital stay, such as mandatory use of surgical masks by both patients and staff, minimizing hospital visits and rapid transport of infected patients to COVID-19 services or intensive care units.

Continuous variables are presented as means and standard deviation. Statistical analysis was performed with Student's *t*-test to compare hospital stay, and chi-square test was used to compare mortality between patients with and without SARS-CoV-2 infection.

Results

During the study period, 301 surgeries were planned. Surgical procedures were performed due to cancer originating from colon (105, 34.8%), rectum (91, 30.2%), stomach (74, 24.6%), periampullar region (16, 5.3%; head of pancreas 12, 4%; duodenum 1, 0.3%; ampulla 3, 1%), distal pancreas (4, 1.3%), esophagus (3, 1%), retroperitoneum (2, 0.7%), ovary (2, 0.7%), endometrium (1, 0.3%), spleen (1, 0.3%) and small bowel (2, 0.7%). The mean age of the patients was 64 ± 12 years. The number of male and female patients was 200 and 101, respectively. According to the American Society of Anesthesiology (ASA) Physical Status Classification, the proportional sequence of the patients was as follows: ASA-3 53.4% (161), ASA-2 39.3% (118), ASA-4 5.6% (17), ASA-1 1.7% (5).

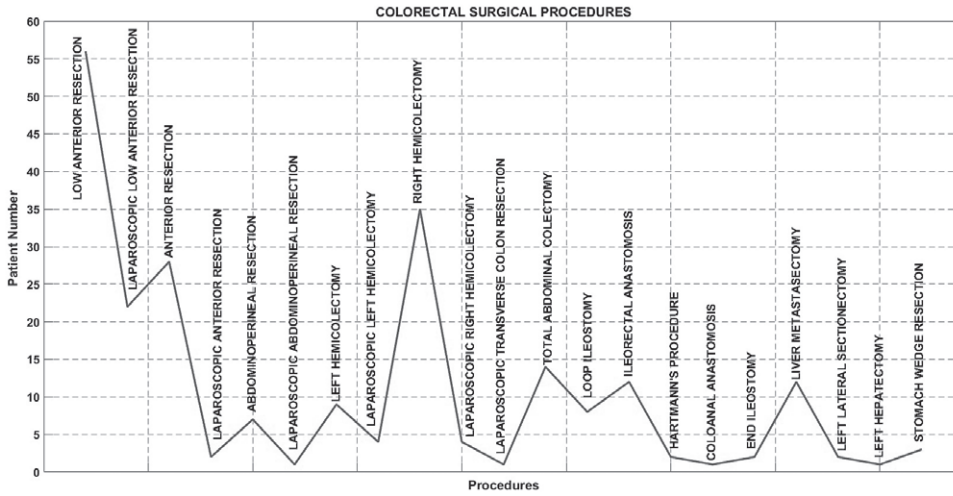

Figure 1 – Colorectal surgical procedures.

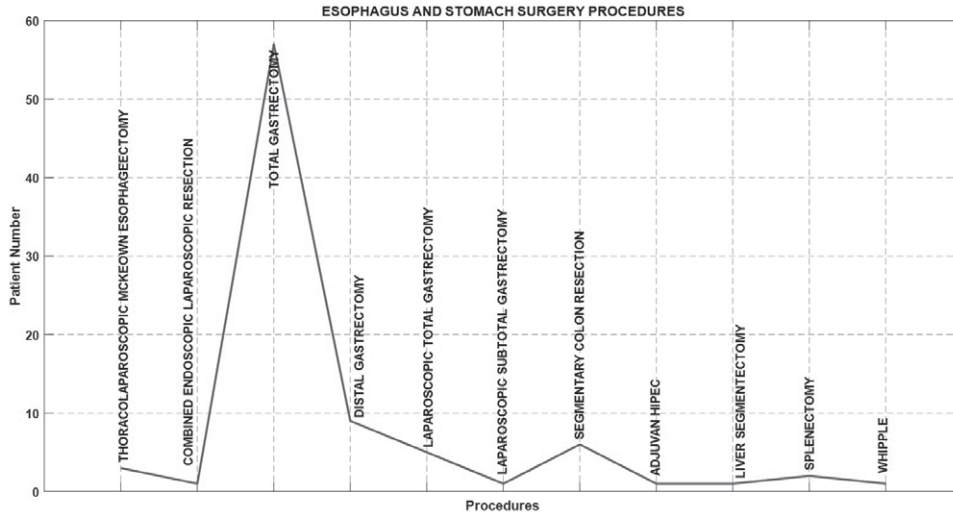

Figure 2 – Esophageal and gastric surgical procedures.

The total number of surgical procedures performed at our hospital within this period was 395. The surgical procedures classified as colorectal, esophageal/gastric, cytoreductive and other surgical procedures. Figures 1–4 show them.

Preoperative screening for SARS-CoV-2 infection was performed in 301 patients and was positive in 4 (1.3%). All four patients were asymptomatic and had their surgeries postponed. There were no patients who had chest CT findings suggestive

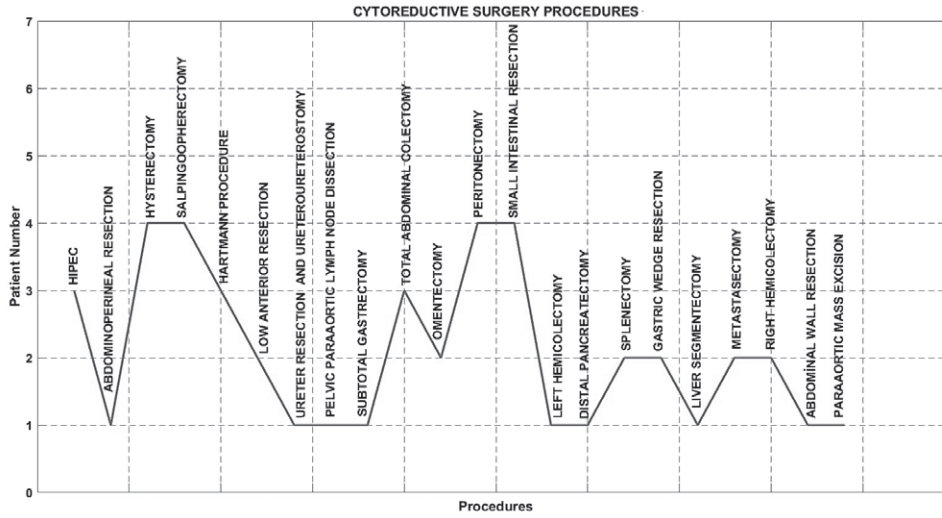

Figure 3 – Cytoreductive surgery procedures.

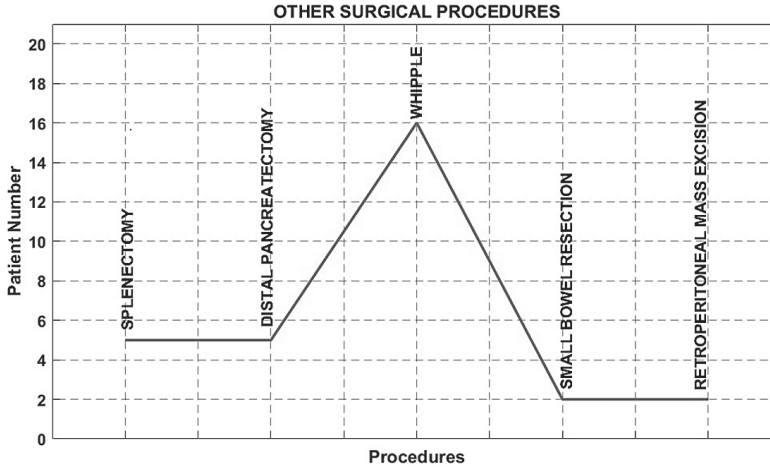

Figure 4 – Other surgical procedures.

of SARS-CoV-2 infection, and/or who had both tests positive. These patients were taken to isolation rooms. Their treatment was completed, and surgery was performed after the SARS-CoV-2 test results became negative.

During the postoperative period, 2 (0.67%) patients developed respiratory symptoms and tested positive for SARS-CoV-2 infection, of which 1 died in the intensive care unit, with a mortality rate of 50% (n=1/2). The fatality due to COVID-19 was described as follows: a 68-year-old man who underwent open

total gastrectomy and D2 lymph node dissection for gastric cancer and had a past medical history of diabetes and smoking. The cause of death was attributed to COVID-19-related complications.

Of the patients without SARS-CoV-2 infection, two patients died in the postoperative period, with a mortality rate of 0.67% (n=2/299): a 72-year-old man who had a past medical history of diabetes, chronic renal failure underwent open total gastrectomy and D2 lymph node dissection. The patient had a sudden onset of abdominal pain on the eighth postoperative day, was re-operated for small bowel perforation. He died as a result of multiple organ failure on the fourteenth postoperative day. The other was a 75-year-old man who had a past medical history of hypertension, coronary artery disease underwent total gastrectomy and D2 lymph node dissection. The patient had postoperative ileus. On the tenth postoperative day, he underwent re-laparatomy and bridectomy. During the intensive care follow-up, respiratory failure developed due to acute respiratory distress. The mortality rate was significantly higher in patients infected with SARS-CoV-2 ($p<0.01$). The mean hospital stay was also significantly longer in patients who developed the infection during the postoperative period (21.5 ± 9.1 days versus 8.2 ± 5.2 days; $p<0.01$). According to the national patient registration system, no COVID-19 positivity was observed during the follow-up period.

Discussion

At the beginning of the COVID-19 pandemic, postponing surgeries and cancelling medical appointments seemed to be the most reasonable option (Grubic et al., 2020; Iacobucci, 2020). However, they were proven to be inadequate as the pandemic has not subsided and we have severely struggled with Omicron variant of SARS-CoV-2, as a new challenge for the global public health (Thakur and Ratho, 2022) while this paper is written.

Despite the strict visitor policies and protective measures, during the postoperative period, 2 (0.67%) patients developed respiratory symptoms and tested positive for SARS-CoV-2 infection. This suggested the possibilities of in-hospital contamination and preoperative screening test performed during the window period of acute infection.

Due to the theoretical risk of aerosolization, at the beginning of the pandemic we avoided the laparoscopic approach. But the lack of strong evidence against the benefits of minimally invasive surgery (Mintz et al., 2020; Ribeiro et al., 2020) we abandoned this practice. However, due to the decrease in the number of operating rooms, intensive care and service beds, performing complex surgical procedures and the continuation of elective surgeries for benign diseases, except for the first wave of the pandemic, prevented laparoscopic procedures from being performed as often as we wanted (14.7% vs. 85.3%).

The mortality rate of COVID-19 in the postoperative period was considered high. One of two patients (50%) who developed symptomatic infection died after

prolonged hospital stay in the intensive care unit. Studies on COVID-19 mortality in the postoperative period for elective gastrointestinal oncological surgical procedures are limited but the general mortality of this infection in patients with cancer is up to 25% (COVIDSurg Collaborative, 2020; Doglietto et al., 2020; Lei et al., 2020; Luong-Nguyen et al., 2020; Yang et al., 2020). It is likely that the mortality rate due to COVID-19 in our series is overestimated because patients were not routinely tested in the postoperative period, just those with a suggestive clinical scenario, which likely led to a selection bias. As shown in different studies (Liang et al., 2020; Yanez et al., 2020; Zhang et al., 2020), we attribute the high mortality found in our study to the disease severity and the profile of patients that attended our hospital, which is a tertiary institution that treats patients with advanced tumours, aged over 65 years, male gender, frequently have other associated chronic disease, as demonstrated by the ASA classification, in which 161 patients (53.4%) were classified as ASA-3. The profile of surgical procedures was also extremely complex as shown Figures 1–4. Despite these, 99% of patients were safely discharged after elective gastrointestinal surgical procedures during the pandemic.

As a limitation, this study reflects a single-center experience; therefore, we are aware that our outcomes should be compared with comprehensive studies to make an exact comment on gastrointestinal surgical procedures due to cancer during pandemics.

Conclusion

Our results suggest that during the pandemic elective gastrointestinal oncological procedures may be safely performed, but preoperative testing and precautions to minimize contamination are paramount, since the mortality due to SARS-CoV-2 infection in the postoperative period is particularly high and hospital stay is also significantly increased.

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