



ORIGINAL ARTICLE

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Lockdown effect on emergency surgical consults during the covid-19 outbreak: Experience of a pandemic hospital

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Abstract

The covid-19 pandemic has significantly impacted many lives and health care systems around the world. Many countries have imposed lockdowns and extraordinary restriction measures including curfews to control the disease. This study aimed to evaluate the lockdown effect on surgical emergencies during this outbreak. Patients admitted to the emergency department (ED) and referred to general surgery (GS) was retrospectively analyzed during the first lockdown period (April 1-May 31,2020) and before the covid-19 pandemic, corresponding time last year (April 1-May 31,2019). Patient admission rates to ED and general surgery outpatient clinics, patient characteristics, reasons for consultation, hospitalization rates, surgical intervention requirements, and reasons for urgent surgery were compared. A significant reduction was observed in the number of patients admitted to ED, and general surgery consultation is required in the covid-19 lockdown period (72% and 32% decrease respectively). There was no difference in hospitalization and surgical intervention rates between the groups ($p=0.158$ and $p=0.871$ respectively). The number of patients referred to general surgery with a diagnosis of perianal disorders was significantly higher in the lockdown group. Covid-19 lockdown and restrictions have dramatically decreased general surgery patients' admissions to emergencies. This situation suggests that some patients with serious diseases may not apply to the emergency departments and so may delay their treatments. Establishing pandemic hospitals and directing uninfected patients to centers other than pandemic hospitals can reduce these delays. We hope, this study findings will be guiding health authorities in making rearrangements in hospitals during subsequent waves and lockdowns in this pandemic and other new pandemic in the future.

Keywords: Covid 19 lockdown, surgical consult, emergency, outbreak, pandemic

Introduction

After the announcement of the SARS-COV-2 virus turning into a pandemic in March 2020 by World Health Organization (WHO), many countries have implemented their own measures and quarantine practices including curfews [1,2]. As a result of these restrictions, people's contact with each other was tried to be minimized and life became to a standstill. After March 11,2020, when the first covid 19 case was seen in our country, restrictions have then started and increased gradually [3]. Immediately after the first death due to the disease, a lockdown was declared by the government and it was fully implemented by the end of March.

At the beginning of the pandemic, the absence of an effective treatment method and vaccination against this disease has made restrictions mandatory in our country, as in many countries. The closure of schools, shopping centers, cafes, restaurants, and bars, the cancellation of organizations where people can be found together, intercity travel bans, and the curfews on weekends are some of these restrictions, and in our country, they are most intensely implemented in April and May 2020. In this period, it was aimed to prevent excessive concentrations that may occur in hospitals with the restrictions applied in this period, the recommendations for the public to stay at home, and the publications stating that hospitals should not be consulted except for emergencies. Also, all elective operations, non-urgent interventions, except for cancer surgeries, were postponed during this period.

It has been reported in some studies that emergency surgical admissions to hospitals substantially decreased during the covid-19 pandemic [4–8]. Also, it was stated that some patients in need of urgent surgery treatment were delayed in hospital admissions due to the precautions taken within the scope of quarantine and the

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fear of covid-19 transmission [7]. In our country, this situation is a matter of curiosity. This study aimed to examine the lockdown effect on emergency surgical admissions and emergency surgical operations during the quarantine period in our center, which serves as a 3rd stage education and research hospital in its region and is considered as a pandemic hospital with the covid-19 outbreak.

Materials and Methods

This study was conducted retrospectively in Samsun Training and Research Hospital, following the approval of the local ethics committee (Date: 30.09.2020, protocol number: GOKA/2020/14/1) and the covid-19 scientific research board of the Ministry of Health. Our hospital is a tertiary healthcare facility with a capacity of 450 service and 100 intensive care unit beds, serving approximately 1.3 million people in its region. In this study, two different periods were determined to compare. The first group was the covid-19 lockdown period which was announced by the government after the Covid-19 pandemic (April 1,2020–May 31, 2020), considered as during lockdown group. The second group was the non-pandemic period; before the covid-19 pandemic in the same period last year (1 April 2019–31 May 2019), considered as pre-lockdown group. First, using the hospital computer database records, patients admitted to general surgery outpatient clinics and emergency department (ED) were determined. Then patients who applied to ED and for whom the general surgery consultation is requested were examined in terms of age, gender, the reasons for the consultation, hospitalization and operation status, reasons for emergency surgery, and mortality. In this study, 2 months after April 1,2020, was included. The reason why this date was chosen is that it was the period when restrictions due to the covid-19 pandemic were most intense in our country and all interventions and hospitalizations were canceled or postponed except for emergency and cancer patients in our hospital.

Reasons for consultation were evaluated under six main categories; trauma, gastrointestinal system (GIS) diseases, postoperative complications, perianal diseases, abdominal wall disorders, and others. In this category; trauma included all traffic accidents, falls, gunshot wounds, stab wounds, and blunt abdominal trauma. GIS diseases included acute appendicitis, acute cholecystitis, pancreatitis, hollow viscus perforations, GIS hemorrhages, small bowel, and colonic obstructions. Postoperative complications included surgical site infections, anastomotic leaks, and abdominal wound eviscerations. Perianal diseases included perianal abscesses, thrombosed hemorrhoids, and pilonidal abscesses. Abdominal wall disorders included incarcerated or strangulated inguinal or incisional hernias.

Reasons for emergency surgeries were also categorized under 5 main headings; GIS diseases (acute appendicitis and other GIS diseases), abdominal trauma, hernia, perianal disorders, and others. Acute appendicitis included all non-complicated and complicated appendicitis. Other GIS diseases included ileus (small bowel or colonic obstruction), GIS perforations and hemorrhages, and cholecystitis. Trauma included hepatic or splenic laceration, colon perforation, and small bowel injuries due to all traffic accidents, falls, gunshots, and stab wounds. Hernia included incarcerated or strangulated inguinal and incisional hernias; Perianal disorders included perianal abscesses and hemorrhoids. Others included diagnostic laparotomy and breast abscess drainages.

In this study, all patients over the age of 18 who presented to the emergency department and were referred to general surgery were included. The patients were categorized as over 65 and under 65 years old. According to available data, elderly people were more likely to be infected with the virus, and mortality rates due to covid-19 disease have been reported to be relatively high in patients age 65 years or older[9]. So, people over the age of 65 had the heaviest restrictions and longest curfew in our country.

Statistical analysis was performed using SPSS statistical package version 23.0 (SPSS Inc., Chicago, IL, USA). All data were tested for normal distribution by the Shapiro Wilk test. Mann-Whitney U test was used when comparing non-normally distributed variables (e.g., age). Categorical variables are presented as the frequency with percentages and were analyzed using the Pearson chi-square test and Fisher's exact test. $P < 0.05$ was set as statistical significance.

Results

A total of 35260 patients presented to the emergency department (ED) in the non-pandemic period. Of these, 363 patients (1.02%) were consulted to our GS unit. Whereas in the lockdown period a total of 9587 patients presented to the ED. Of these, 247 patients (2.56%) were referred to our general surgery unit. This represents a 72% decrease in the number of patients admitted to ED and a 32% decrease in the number of patients for whom general surgery consultation is requested in the covid-19 pandemic period. The number of patients admitted to the general surgery outpatient clinics and emergency department by groups is shown in Figure 1. A dramatic reduction in admissions to ED and GS outpatient clinics can be seen in this graphic.

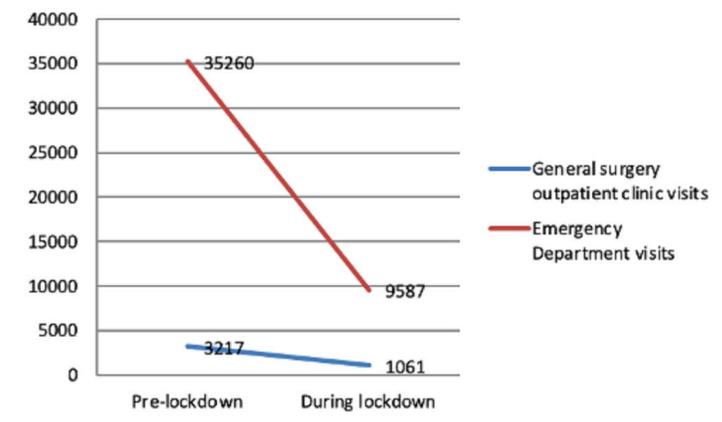


Figure 1. The number of surgery patients admitted to general surgery outpatient clinics and emergency department, by periods

The mean age of surgical patients admitted to ED was 54.4 ± 20.97 years. Age groups and gender were comparable between groups without a statistically significant difference ($p = 0.791$ and $p = 0.495$ respectively). Demographic characteristics of patients are depicted in Table 1. Although there are more restrictions and curfews for people over the age of 65 during the lockdown period, there was no difference in the admissions of this age group to the emergency departments compared to the previous period.

Emergency GS Consultations

A total of 610 emergency surgical consults were evaluated

(363; pre-lockdown, 247; during lockdown). The number of consultations during the lockdown period decreased significantly by 32% ($p=0.001$). GIS disorders are among the most common reason for consultation with a rate of 75.2% in pre-lockdown and 70% in during lockdown group. Trauma and GIS disorder consultation rates were similar between the groups ($p=0.305$, $p=0.182$ respectively). Whereas consultations for postoperative complications and abdominal wall hernia were significantly higher in the pre-lockdown group. On the other hand, consultations for perianal benign emergencies were significantly higher during the lockdown group ($p=0.023$). There was no significant difference in hospitalization, surgical intervention, and mortality rates between the groups ($p=0.158$, $p=0.711$, and $p=0.164$ respectively). Details of consultations are depicted in Table 2.

Table 1. Demographic information of surgical patients admitted to emergency department

	Pre-lockdown (n=363)	During lockdown (n=247)	Total (n=610)	P value
Age (mean±SD)	55.27 (20.45)	53.11 (21.69)	54,4 (20,97)	0.213 ^a
Age groups				0.791 ^b
<65, n (%)	236 (65%)	158 (63.9%)	394 (64.5%)	
≥65, n (%)	127 (35%)	89 (36.1%)	216 (35.5%)	
Gender				0.495 ^b
Male	153 (42.1%)	110 (44.5%)	263 (43.1%)	
Female	210 (57.9%)	137 (55.5%)	347 (56.9%)	

SD: Standard deviation, a: Mann Whitney-U test, b: Pearson Chi-Square

Table 2. Comparison of the general surgery consultations requested from emergency department during covid-19 lockdown, by study period

	Pre-lockdown	During lockdown	P value
Number of consultations	363	247	0.001 ^b
Reason for consultation			
Trauma	55(15.2%)	45(18.2%)	0.305 ^b
GIS disorders	273(75.2%)	173(70%)	0.182 ^b
Postoperative complications	10(2.7%)	0(0%)	0.009 ^b
Perianal disorders	7(1.9%)	13(5.2%)	0.023 ^b
Abdominal wall hernia	13(3.5%)	3(1.2%)	0.031 ^b
Others	5(1.3%)	13(5.2%)	
Hospitalization	Yes:196(54%) No:167(46%)	Yes:119(48.2%) No:128(55.8)	0.158 ^b
Surgical intervention	Yes:75(20.6%) No:288(79.4%)	Yes:48(19.4%) No:199(80.6%)	0.711 ^b
In hospital mortality	1(0.2%)	4(1.6%)	0.164 ^c

GIS: gastrointestinal system. Trauma included all traffic accidents, falls, gunshots and stab wounds; GIS disorders included all intraabdominal emergent surgery needed situations except trauma. Abdominal wall hernia included incarcerated or strangulated inguinal and incisional hernias; Perianal disorders Included perianal abscess and thrombosed hemorrhoids. Bold values show significance. b: Pearson Chi-Square, c: Fisher Exact test

Emergency GS Operations

A total of 123 emergency surgical operations were analyzed (75; pre-lockdown, 48; during lockdown). Acute appendicitis was the most common surgical operation in both groups with a rate of 52% in pre-lockdown and 50% during lockdown group. Among

acute appendicitis, complicated appendicitis was not detected in the pre-lockdown group, while two patients had perforated and one patient had plastron appendicitis during the quarantine period. There was no significant difference in other GIS diseases, trauma, hernia, perianal disease, and other emergency surgeries between the groups. Details are shown in Table 3.

Table 3. Comparison of the reasons for emergency surgery during covid-19 lockdown, by study period.

Reasons for surgery	Pre-lockdown	During lockdown	P value
*Acute appendicitis	39 (52%)	24 (50%)	0.554 ^b
^o Other GIS diseases	19 (25.3%)	9 (18.7%)	0.297 ^b
^a Abdominal Trauma	7 (9.3%)	5 (10.5%)	0.940 ^b
^β Hernia	5 (6.7%)	1 (2.1%)	0.399 ^c
^x Perianal disorders	4 (5.4%)	8 (16.6%)	0.067 ^c
^o Others	1 (1.3%)	1 (2.1%)	1.000 ^c
Total surgical intervention	75	48	0.711 ^b

*Included non-complicated, complicated appendicitis and perforated appendicitis; ^oOther in-cluded ileus (small bowel or colonic obstruction), GIS perforations and hemorrhages, cholecystitis; ^aTrauma included splenic laceration, colon perforation and small bowel injuries due to all traffic accidents, falls, gunshots and stab wounds; ^βHernia included incarcerated or strangulated inguinal and incisional hernias; ^xIncluded perianal abscess and hemorrhoids; ^oOthers included diagnostic laparotomy and breast abscess drainages. GIS, Gastrointestinal system, b: Pearson Chi-Square c: Fisher Exact test

Discussion

In this study, it was observed that during the lockdown period there was a dramatic decrease in the total number of emergency department admissions and the number of patients for whom general surgery consultation was requested compared to the same period in 2019. This finding was consistent with many other international studies [10–14]. It was thought that the main reason for this decrease in emergency admissions was that patients avoided unnecessary visits to emergencies due to the fear of covid 19 contamination. In one meta-analysis of studies in the non-pandemic times, it was emphasized that at least 30% of emergency department admissions in the United States are actually non urgent [15]. When this rate is taken into consideration, it is thought that there are other reasons behind the 72% decrease we found in our study. One of these reasons may be that patients try to cure some real emergency diseases at home by themselves, which leads to worsening of diseases and to encountering more complicated cases.

In our study, a 32% decrease was detected in patients referred to general surgery during the quarantine period compared to the non-pandemic period, and it was found to be statistically significant. This finding is 84.45% in the study of Vanni et al. [5] and 52% in the study of Patel et al. [7]. The fact that the decrease in our study was relatively lower compared to other data in the literature can be explained by the countries' quarantine practices at different levels, the differences in the risk perception of the patients, and the different date range for comparison. On the other hand, in a study investigating the effect of the covid 19 pandemic on orthopedic emergencies, Uluöz et al. [16]. found that the number of patients who applied to the emergency department during the pandemic period was higher than the non-pandemic period. The reason for this was emphasized that the patients had difficulty in reaching the orthopedic outpatient clinics during the pandemic

period. Moreover, in a study investigating the effect of the covid 19 pandemic on colorectal cancer surgery, Uyan et al. [17] found that more emergency colorectal surgery was performed during the pandemic period compared to the pre-pandemic period. They also reported that more advanced pathological stage of the patients was encountered in the pandemic.

In our study, no difference was found between the two groups in terms of age and gender characteristics of patients for whom general surgery consultation was requested. Unlike our study, only one study from our country found that female patients' referral to emergency services during the covid-19 pandemic period was significantly reduced compared to the non-pandemic period, and it was suggested that this may be due to the risk of infection in female patients causing more anxiety and stress [11].

When the reasons for the requested consultation were examined, we found a decrease in the number of all reasons except perianal diseases. Interestingly, perianal emergencies were almost doubled in the pandemic lockdown period in our study. Unlike our findings, in a Spanish study, a 56% decrease was found in proctological emergency consultations during the pandemic period [18]. The reason for this difference is thought that in the study of Gonzalez et al., complaints such as rectal bleeding and perianal tumors were evaluated in the proctologic emergency group. Whereas in our study, rectal bleeding and tumors were evaluated in terms of gastrointestinal disorders.

When the admissions related to trauma were analyzed, 55 patients in the pre-lockdown period and 45 patients in the covid-19 lockdown period were evaluated by our general surgery department due to various trauma reasons. Although there was a slight decrease in the number of trauma patients during the lockdown period, no statistical difference between groups was found. In a similar study conducted in Auckland city hospital, unlike our findings, it was stated that there was a significant decrease in the number of trauma patients [4]. In another study, in which 85 trauma centers were included, it was found that trauma patients decreased by 32.5% in the early period of the covid-19 pandemic [19]. It was thought by the authors that despite the implementation of complete lockdown, including intercity travel restrictions and curfews, people did not comply with the restrictions adequately.

In our study, while there was no difference between the groups in consultations related to gastrointestinal diseases, admissions due to postoperative complications and abdominal wall hernias were found to be higher in the pre-lockdown period. The fact that elective surgeries are performed in the pre-lockdown period and that patients are more comfortable in admitting to hospitals can explain this difference. On the other hand, during the quarantine period, a significant increase was observed in emergency admissions due to perianal diseases. We think curfew restrictions, recommendations for staying home, changes in eating habits and weight gain may have increased perianal diseases.

Hospitalization and surgical intervention rates of consulted patients were similar between the groups ($p=0.153$ and $p=0.711$ respectively). Also, there was no difference in mortality of referred patients between the two periods ($p=0.164$). One mortality occurred in the pre-lockdown period due to postoperative multiple organ failure. Whereas during the lockdown period, four deaths were seen (two of them were because of trauma and hemorrhagic

shock and two of them were because of postoperative sepsis). None of these mortalities were related to the covid-19 disease. Similar to our findings, there was no statistical difference in mortality between pandemic and non-pandemic periods in New Zealand and United Kingdom studies [4,6].

There was a 36% decrease in total emergency surgical interventions during the lockdown period but this difference did not reach statistical significance (75 versus 48, $p=0.711$). This decrease was due to the decrease in hospital admissions of patients. Acute appendicitis was the most common operation among all emergent surgeries in both groups. Similarly, a retrospective multicenter study from Austria showed that the appendectomy was the most frequently performed emergency surgery during pandemic lockdown [20]. Also, there was no significant difference between groups in other reasons for emergent surgeries in our study.

There are some limitations of this study. Firstly, this study was retrospective in nature. Because of that, some patient's data may not be recorded and so may not be assessed by researchers. Secondly, this was a single-center cohort study of a pandemic hospital. So, it may not reflect all of the patients in general. Also, some patients may have chosen to admit other hospitals in the pandemic lockdown period in our region. Thirdly, postoperative complications and morbidity could not be evaluated in this study due to the lack of data on this subject. and therefore, no opinion can be expressed about whether the covid 19 lockdowns have an effect on the severity of the diseases in general surgery patients. Lastly, this study does not include data on patients who do not accept hospitalization and prefer spontaneous recovery at home or in the community. The exact number of such patients cannot be predicted precisely, and this may have influenced our results.

Conclusion

The covid-19 pandemic and associated lockdown have caused significant changes in emergency general surgery admissions in our country as well as in the world. Although there was a 32% reduction in emergency surgery consultations, there was no significant reduction in the rate of trauma-related consultations. Also, perianal emergency diseases increased during this period. These findings suggest that some patients with serious illnesses may not seek emergency care and so may delay their treatment. During such epidemic periods, establishing pandemic hospitals and directing uninfected patients to centers other than pandemic hospitals can reduce these delays. We hope this study will be helpful for healthcare authorities when making surgical planning and rearranging the healthcare resources in future pandemic lockdowns.

Conflict of interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

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Ethical approval

Ethics approval was granted by the Institutional Review Board of Samsun Education and Research Hospital (Protocol number: GOKA/2020/14/1).

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