



PLANNING TO 'NEW NORMAL' DURING COVID-19 PANDEMIC AT GENERAL SURGERY DEPARTMENT: A TURKEY EXPERIENCE

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SUMMARY – Planning of non-postponable treatments for cancer, trauma, emergency diseases, and follow-up and treatment of chronic diseases are inevitable for the ongoing pandemic and future pandemics. In this study, we evaluated the capacity of surgical applications and treatments made to the surgery department in the first 3 months of the onset of the COVID-19 pandemic. A retrospective cohort study was performed from March 12, 2020 to June 1, 2020. COVID-19 negative general surgery patients were included. Demographics, diagnosis and management were recorded, as well as bed turnover and length of stay in the hospital. Similar data were collected on patients admitted during the same period in 2019 and 2018 to allow for comparison. A total of 1764 operations were included. There was a reduction in surgeries when comparing 2020 with 2019 and 2018 (164 *vs.* 713 and 890); however, there was no difference in the length of stay in the hospital (4.12 *vs.* 4.37 and 4.07 days, $p=0.626$). During 2020, appendectomies decreased (53 *vs.* 102 and 100, $p=0.013$). There was no difference in the number of emergency oncologic surgeries during 2020 as compared with 2019 and 2018 (16 *vs.* 8 and 13, $p=0.149$). In conclusion, COVID-19 significantly impacted the number of admissions to general surgery. However, cancer and emergency operations continued to be required, thus provisions need to be made to enable planning these interventions.

Key words: *COVID-19 pandemic; New normal; Cancer surgery; Emergency surgery*

Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) came to the world agenda in December 2019 with cases first detected in Wuhan, China¹. The virus that spreads *via* droplets is the cause of SARS-CoV-2 (COVID-19) infection². Emergency epidemic action plans were implemented all over the world af-

ter the World Health Organization (WHO) had declared the COVID-19 infection process as a pandemic on March 11, 2020. First COVID-19 positive patients were detected in Turkey on March 11, 2020. The state prepared a package of general precautions, a curfew was imposed on citizens at certain time intervals and age ranges, and activities were suspended in many business lines, from barbers to restaurants and schools. Hospitals and the entire health system were put on alert, and all available facilities were included in planning of smooth running of the pandemic process at an optimum level. The first SARS-CoV-2 infection guide was published by the Ministry of Health on March 13, 2020, along with a proposal for postponement of elective procedures.

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Our hospital was proclaimed one of the pandemic hospitals. Services, emergency and intensive care units, operating room working patterns, and examination rooms were rearranged within the framework of the pandemic struggle plan. Elective surgeries were delayed or even cancelled. Emergency operations and some non-postponable surgical procedures continued to be performed. During the pandemic process, published studies and recommendation packages containing evidence-based COVID-19 related surgical algorithms became guiding for surgeons working in the field¹⁻⁶.

Continuation of the pandemic process, the second and third waves, and even in the era of pandemics thought to be approaching, reorganization of surgical departments should be planned considering emergency and elective surgical procedures that should continue despite all restrictive precautions^{7,8}.

In this study, we compared differences between the same periods in 2018 and 2019, and from March 11, 2020 to May 31, 2020. We evaluated surgical workload, number of patients and their change, surgical procedures that should continue urgently and electively regardless of the cause of the pandemic.

Material and Methods

It was planned to retrospectively evaluate the files of all patients who were hospitalized in the General Surgery Department, Kütahya Health Sciences University Faculty of Medicine, Evliya Çelebi Training

and Research Hospital in March-April-May 2018, 2019 and 2020. Approval for the study protocol was obtained from the institutional Ethics Committee.

General surgery examinations, general surgery service bed occupancy rates and bed turnover rates of patients who were not suspected or diagnosed with COVID-19 were evaluated. The emergency-elective distribution of the operations and distribution of oncologic cases were evaluated. Patients were grouped by years based on the same period of years.

Patients with a diagnosis or suspected of COVID-19 infection, patients under 18 years of age, pregnant patients, minor surgical procedures (lipoma excision, sebaceous cyst excision, superficial abscess drainage) were excluded from the study.

Findings were obtained using the IBM SPSS Statistics 20 statistical program and Frequency Tables, Line Graph, Bar Graph and Pie Graph. The universal ratio significance test was used to determine whether there was a statistically significant difference among the percentages of more than two independent groups (years).

Results

In the same period of the last three years (March-April-May), there was a decrease in the frequencies of variables such as examination, surgery and inpatient treatment in the general surgery service in 2020 (Table 1). The decrease in outpatient clinic examination, inpatient treatment, bed occupancy rate and number

Table 1. Change in the frequency of variables such as examination, surgery and inpatient performed in the general surgery service in the same period of the last 3 years

Variable	2018, n (%)	2019, n (%)	2020, n (%)	p value
Number of polyclinic examinations	9870 (46.65)	8695 (41.09)	2592 (12.25)	0.040*
Number of control examinations	3471 (49.24)	2710 (38.45)	867 (12.30)	0.078**
Number of inpatients	1039 (46.26)	894 (39.80)	313 (13.93)	0.048*
Bed occupancy rate	0.85	0.73	0.34	0.048*
Number of operations	890 (50.45)	713 (40.24)	164 (9.09)	0.023*
Bed turnover rate	19.98 (50.91)	14.66 (37.36)	4.60 (11.72)	0.097**
Mean length of stay in the hospital	4.07 (32.40)	4.37 (34.79)	4.12 (32.80)	0.626

* $p \leq 0.05$; ** $p \leq 0.10$; bed occupancy rate = indicates how much patient bed is used by the patient within a specified time; bed turnover rate = indicates for how many patients a bed is used in a year

Table 2. Frequency information on the types of surgery belonging to the general surgery service in the same period of the last 3 years (March–April–May)

Variable	2018, n (%)	2019, n (%)	2020, n (%)	p value
Emergency operation	224 (39.92)	232 (41.35)	105 (18.71)	0.021*
Elective surgery	666 (55.22)	481 (39.88)	59 (4.89)	0.102**
Emergency oncologic surgery	13 (3.13)	8 (21.62)	16 (43.24)	0.149
Elective oncologic surgery	49 (40.49)	37 (30.57)	35 (28.92)	0.088**

* $p \leq 0.05$; ** $p \leq 0.10$

Table 3. Distribution of oncologic cases at the general surgery service in the same period of the last 3 years (March–April–May)

Variable	2018, n (%)	2019, n (%)	2020, n (%)	p value
Hepatopancreatobiliary cancer	5 (41.66)	4 (33.33)	3 (25)	0.070**
Colorectal cancer	21 (33.33)	18 (28.57)	24 (38.09)	0.049*
Upper GIS system (esophagus, stomach) cancer	12 (46.15)	5 (19.23)	9 (34.61)	0.156
Breast-endocrine cancer	24 (42.10)	18 (31.57)	15 (26.31)	0.090**

* $p \leq 0.05$; ** $p \leq 0.10$; GIS = gastrointestinal system

Table 4. Distribution of patients undergoing emergency surgery in the same period of the last 3 years (March–April–May)

Variable	2018, n (%)	2019, n (%)	2020, n (%)	p value
Appendectomy	100 (39.21)	102 (40)	53 (20.78)	0.013*
Emergency cholecystectomy	12 (0.22)	34 (64.15)	7 (13.20)	0.659
Penetrating cutting tool injury	3 (42.85)	2 (28.57)	2 (28.57)	0.126
Firearm injury	3 (50)	2 (33.33)	1 (16.66)	0.126
Traffic accident injury	5 (45.45)	3 (27.27)	3 (27.27)	0.156
Ileus/gastrointestinal system perforation/ incarcerated hernia/volvulus	74 (44.57)	66 (39.75)	26 (15.66)	0.036*
Mesenteric ischemia	6 (50)	4 (33.33)	2 (16.66)	0.126
Fournier/perianal abscess	21 (41.17)	19 (37.25)	11 (21.56)	0.032*

* $p \leq 0.05$; ** $p \leq 0.10$

of operations was statistically significant ($p \leq 0.05$). The decrease in control and bed turnover values was statistically significant ($p \leq 0.10$). There was no statistically significant change in the mean length of stay in the hospital according to years (Table 1).

In the same period of the last three years (March–April–May), when the frequency information on the types of surgery in the general surgery service was evaluated, there was a decrease in the frequencies of other variables except for emergency oncologic surgery.

ies in 2020. The decrease in emergency surgery values was statistically significant ($p \leq 0.05$). The decrease in the values of elective surgery and elective oncology cases was statistically significant ($p \leq 0.10$). On the other hand, there was no statistically significant change according to years in emergency oncologic operations (Table 2).

The frequency information regarding distribution of oncologic cases in the general surgery service is shown in Table 3. The change in colorectal cancer cases was statistically significant ($p \leq 0.05$). The decrease in hepatopancreatobiliary cancer and breast-endocrine cancer cases was statistically significant ($p \leq 0.10$). There was no statistically significant change in the upper gastrointestinal system (esophagus-stomach) cancer cases (Table 3).

When the distribution of cases undergoing emergency surgery in the general surgery service was evaluated, there was a general decrease in 2020. The decrease in cases of appendectomy, ileus-gastrointestinal system perforations, incarcerated hernias, volvulus, Fournier's gangrene, perianal abscess was statistically significant ($p \leq 0.05$). The change in emergency cholecystectomy, stab injury, gunshot injury, traffic accident injury, and mesenteric ischemia (arterial-venous) cases was not statistically significant (Table 4).

Discussion

In the first wave of the pandemic, normalization with a decrease in the number of COVID-19 cases entered our lives with a completely different concept of the 'new normal'. This new concept brought habits that we had not previously practiced in our entire social life, from the education system, public transportation systems, shopping habits, places of worship, sports world, restaurants, etc. As in the fields mentioned in the previous sentence, the entire health organization had to be rearranged all over the world with the concept of the 'new normal'.

Hospital departments were prepared for appropriate use of the necessary intervention opportunities for the pandemic worldwide, and elective surgical procedures were minimized. Hospital beds were reserved for use of pandemic patients, while post-anesthesia recovery areas and operating rooms were designed as intensive care units. Our clinic had 62 beds, which we used as a general surgery department in our hospital; it was transformed into a pandemic clinic, and general surgery, orthopedics and cardiovascular surgery clinics

continued to serve together as different 20 inpatient clinics.

According to the results obtained, the number of patients presenting to the outpatient clinic for examination, number of inpatients, surgical bed occupancy rate and number of operations decreased at a level that could be considered statistically significant in the pandemic. Considering these results, the number of control examinations in surgical patients followed up decreased at a level that would be considered statistically significant. The reason for this decrease were restrictions applied in the management of the epidemic, and patients tried to stay away from the hospital environment as much as possible and postponed control examinations for their chronic problems.

Differentiating between pandemic hospitals and normal hospitals, inpatient services, polyclinic and waiting areas were rearranged within the concept of social distance. Studies have shown that the hospitalization period of COVID-19 negative patients should be shortened⁹. However, when we consider the months covered by our study, despite the statistically significant decrease in bed occupancy rate and bed turnover rate, a statistically significant result was not found in the length of hospital stay. Although the number of short-term hospitalization needed in cholecystectomy and hernia surgery cases decreased, the length of the general hospital stay was not affected due to the increasing number of oncologic emergency surgery cases.

There was no statistically significant decrease in the number of patients applying for control examination ($p = 0.078$). Postoperative controls can be reduced employing outpatient visits and preparation of digital hospital infrastructures. It is necessary to spread digital hospital infrastructures to large areas and to transfer patient follow-ups to digital environment with the use of telemedicine¹⁰⁻¹². It is necessary to expand outpatient treatment choices, to expand treatment algorithms in order to apply this structure and to adapt the healthcare infrastructure to this^{12,13}. By strengthening the primary healthcare system, it will be possible to minimize the rates of hospital admission^{14,15}.

Increasing health costs, increasing examinations (polymerase chain reaction (PCR), thorax computed tomography (CT)) for suspicion of pandemics, increase in examination-surgery costs with the use of personal protective equipment, increase in operating costs of the health institution (increase in negative pressure environments, increase in personnel costs, iso-

lation, disinfection, cleaning costs) will appear as problems that need to be solved in insurance systems¹⁵⁻¹⁷.

Health data, including healthcare professionals working in general surgery departments, were not evaluated in our study. During the period covered by the study, only one general surgeon was diagnosed with COVID-19 and successfully treated. In the 2002 SARS epidemic, 21% of the infected cases consisted of healthcare workers. In a study conducted in China, the rate of COVID-19 infected healthcare workers was 2.7%¹⁸. In a study from England, there were 3% of positive healthcare workers when they tested healthcare professionals with no or mild symptoms¹⁹. With the involvement of healthcare professionals in pandemic processes, the increased workload for healthcare professionals who will take part in non-pandemic health services will become a matter of concern. High-intensity work, pressure, fatigue will bring the need of psychological support in healthcare workers. It is necessary to plan appropriate resting areas and to provide opportunities for healthcare workers in cases that require isolation. Health screenings and PCR tests should be applied to healthcare workers regularly⁹. In an Iran-based study, it was observed that healthcare workers reached the limit levels of anxiety (28.0%), depression (30.6%) and distress (20.1%) disorders²⁰.

Considering the months covered by our study, there was no change in the number of cases, such as gunshot wounds, stab wounds, trauma, emergency admissions and surgeries, which were in the front line of emergency admission to general surgery. Approach differences came into question in treatment algorithms. Medical conservative treatment has to be preferred to early surgical intervention in the picture of acute cholecystitis, cholecystostomies, acute appendicitis medical follow-up, and treatment will be in question²¹. Contrary to this view, in our study, no change was found in the number of emergency cholecystectomies. When evaluated demographically, due to the high number of geriatric patients with comorbid diseases, urgent cholecystectomy was required for gallbladder necrosis, gallbladder perforation, and sepsis.

All patients who underwent elective surgery during the pandemic process were screened for COVID-19 with preoperative PCR and thoracic CT. One patient with symptomatic gallstones was diagnosed by positive PCR, and treatment continued medically, while surgical procedure was postponed. In a study involving 235 hospitals in 24 countries, 1128 patients diagnosed

with SARS-CoV-2 were evaluated. In this study, the diagnosis of SARS-CoV-2 was detected in only 26% of patients in the preoperative period. The diagnosis was possible in the postoperative period in 74% of patients. In this group of patients, 74% of patients underwent emergency surgery. Mortality was 18.9% and 25% in the patients having undergone elective surgery and emergency surgery, respectively. The mortality rate was found to be high in the patient group over the age of 70. Mortality was higher in those diagnosed with SARS-CoV-2 after surgery. When the 30-day general mortality was evaluated, mortality was higher in patients over 70 years of age, male patients, ASA 3-5 patients, malignant, emergency and major surgery patients²².

During the pandemic process in cancer diseases, it will become necessary to implement new strategies (neoadjuvant treatment models) in diagnosis, follow-up and treatment²³. Although it was not considered statistically significant in our study, emergency oncologic patient surgeries were doubled. Emergency colorectal cancer surgery had an important place in this patient group. Only hepatopancreatobiliary and breast-endocrine cancer surgery decreased significantly. There was no significant difference in upper gastrointestinal (stomach, esophagus) cancer surgery. It was thought that the reason for the increase in the number of emergency surgical interventions seen in colorectal cancers was admission of colorectal masses with mechanical intestinal obstruction or bleeding after a delay in screening procedures and examinations. With postponement of screening programs, there may have been an increase in the number of newly diagnosed patients after the pandemic and an increase in the number of patients who are considered to be advanced at the time of diagnosis. More endoscopy teams will be needed to meet the 'new normal' and an increasing number of colonoscopy procedures in colon cancer screenings²⁴. In possible scenarios determined in a study on breast cancer patients, it was thought that 50% of the cases would be diagnosed with a delay of at least six months, and 50% of T1 breast tumors would progress from T1 to T2 with this delay. Delay in diagnosis caused by suspension of screening programs for nonpalpable breast tumors will require more invasive breast cancer treatments (mastectomy). This will result in increased costs, increased anxiety for the patient, and a more difficult and longer recovery period. Considering the patients who underwent oncologic surgery in accordance with

this literature, the number of patients who underwent breast cancer surgery has decreased²⁵. Hospitals are the center of the healthcare system. The application of economic, technological and scientific methods with a multidisciplinary perspective will allow successful results in the health system²⁶. Hospitals that do not admit COVID-19 patients, where COVID-19 patients are not treated, can be prepared. Both patients and staff will need meticulous screening to reduce cross-infection risks. Surgical recovery plans should also take into account that immediate conversion to high-volume surgery may not be possible^{27,28}.

Considering the limitations of this study, it was a retrospective study with a limited number of patients, it covered a period of 3 months with the start of the pandemic, it excluded patients who were diagnosed with COVID-19 requiring surgery and patients on medical treatment without surgery. Ideally, a prospective, longer term multicenter study is needed.

Conclusion

The COVID-19 pandemic affected the number of surgical outpatient and emergency admissions. However, patient applications continued for both emergency operations and cancer surgery. The course of the pandemic and its impact on surgical systems varied between and within countries. The enormous burden of surgical disease that has accumulated due to delayed and cancelled surgeries will require new, system-wide strategies. As in planning for the early stages of the pandemic, preparation needs to be made after the peak of the pandemic and within the normalization process. The relief that is anticipated for surgical systems at the end of COVID-19 will not occur until a while after the peak of the pandemic. Considering this picture, it will be necessary to re-evaluate both hospitals and surgical departments with the concept of the 'new normal'.

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Sažetak

PLANIRANJE ZA "NOVO NORMALNO" TIJEKOM PANDEMIJE COVID-19 NA KLINICI ZA OPĆU KIRURGIJU: ISKUSTVO TURSKE

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Planiranje tretmana koji se ne mogu odgoditi za rak, traumu, hitne bolesti te praćenje i liječenje kroničnih bolesti neizbježni su tijekom ove pandemije i za buduće pandemije. U ovoj studiji procijenili smo opseg prijma i liječenja u kirurškoj klinici u prva 3 mjeseca pandemije COVID-19. Retrospektivna kohortna studija provedena je od 12. ožujka 2020. do 1. lipnja 2020. Obuhvaćeni su bolesnici na općoj kirurgiji negativni na COVID-19. Zabilježeni su demografski podaci, dijagnoza i liječenje, kao i obrtaj bolesnika po krevetu te duljina boravka. Slični podaci prikupljeni su o bolesnicima primljenim u istom razdoblju 2019. i 2018. godine kako bi se omogućila usporedba. Ukupno je bilo uključeno 1764 operacija. Zabilježeno je smanjenje broja operacija 2020. godine u usporedbi s 2019. i 2018. godinom (164 prema 713 i 890); međutim, nije bilo razlike u duljini boravka u bolnici (4,12 prema 4,37 i 4,07 dana, $p=0,626$). Tijekom 2020. broj apendektomija se smanjio (53 naspram 102 i 100, $p=0,013$). Tijekom 2020. godine za hitne onkološke operacije nije bilo razlike u usporedbi s 2019. i 2018. godinom (16 naspram 8 i 13, $p=0,149$). COVID-19 značajno je utjecao na broj bolesnika primljenih na kliniku opće kirurgije. Međutim, slučajevi raka i hitne operacije i dalje su potrebni u vrijeme pandemije i kao takve treba osigurati njihovo planiranje.

Ključne riječi: *Pandemija COVID-19; Novo normalno; Operacija raka; Hitna operacija*