ORIGINAL ARTICLE

Clinical outcomes of obstructive colorectal cancer patients during the coronavirus disease 2019 pandemic

Cemil Burak Kulle, M.D.,[1] Berke Sengun, M.D.,[1] Ali Fuat Kaan Gok, M.D.,[1,2] Ilker Ozgur, M.D.,[1] Adem Bayraktar, M.D.,[1] Cemalettin Ertekin, M.D.,[1] Alisan Berk Deniz, M.D.,[1] Metin Keskin, M.D.[1]

[1] Department of General Surgery, Istanbul University, Istanbul Faculty of Medicine, İstanbul-*Türkiye*

[2] Department of Surgery, Khoja Akhmet Yassawi International Kazakh-Turkish University School of Medicine, Kazakhstan

ABSTRACT

BACKGROUND: The coronavirus disease 2019 (COVID-19) pandemic has affected all aspects of clinical care including diagnosis and treatment of colorectal cancers (CRCs) globally, including in Türkiye. During the initial peak of the pandemic, elective surgeries and outpatient clinics were restricted in addition to the government-imposed lockdown, resulting in a decrease in the number of colonoscopies being performed and patients admitted to inpatient wards for treatment of CRCs. In this study, we aimed to investigate whether the pandemic has affected presentation characteristics and outcomes of obstructive colorectal cancer in this period.

METHODS: This is a single-center, retrospective cohort study based on all CRC adenocarcinoma patients that underwent surgical resection in a high-volume tertiary referral center in Istanbul, Türkiye. Patients were divided into two groups before and after 15 months of identification of "patient-zero" in Türkiye (March 18, 2020). Patient demographics, initial presentation characteristics, clinical outcomes, and pathological cancer stages were compared.

RESULTS: Overall, 215 patients underwent resection for CRC adenocarcinoma during 30 months (COVID era: 107, pre-COVID era: 108). Patient characteristics, tumor location, and clinical staging were comparable between two groups. During the COVID period, the number of obstructive CRCs ($P<0.01$) and emergency presentations ($P<0.01$) increased significantly compared to the respective pre-COVID period. However, there were no differences between 30-day morbidity, mortality, and pathological outcomes ($P>0.05$).

CONCLUSION: Although the results of our study indicate a significant increase in emergency presentation and a decrease in elective admissions of CRCs during the pandemic, patients treated during the COVID period were not at a significant disadvantage in terms of post-operative outcomes. Further efforts should be made to decrease risks related to an emergency presentation of CRCs for future adverse events.

Keywords: Bowel obstruction; colon cancer; COVID-19; pandemic; rectal cancer.

INTRODUCTION

Colorectal cancer (CRC) is one of the most common cancers and causes of death in Türkiye, similar to the rest of the world.[1] Obstructive symptoms are seen in 4–8% of the patients presenting with CRC.[2] It could range from mild obstruction with minor stenosis to severe obstruction presenting with systemic signs.[2] Delay in referral can lead to later diagnosis of CRCs and patients can present with more advanced disease.[3] Perioperative outcomes of patients operated in an emergency setting are worse than the elective setting with a higher risk of anastomotic leak, surgical site infections, and longer in-patient stay.[4,5]

The coronavirus disease 2019 (COVID-19) pandemic has affected all aspects of clinical care including diagnosis and treatment of colorectal cancers (CRCs) globally.[6] The first case of COVID-19 in Türkiye was reported on March 11, 2020

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Address for correspondence: Berke Sengun, M.D.
İstanbul Üniversitesi, İstanbul Tıp Fakültesi, Genel Cerrahi Ana Bilim Dalı, İstanbul, Türkiye
E-mail: berkesengun@gmail.com

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and the first government-imposed lockdown was announced on March 21, 2020. During the initial peak of the pandemic, elective surgeries and outpatient clinics were restricted in addition to the government-imposed lockdown. Many of the in-patient wards, including surgical units, were converted to pandemic wards.[6,7] At that time, it was understood that COVID-19 could not be contained within a short-time frame, elective wards could only be opened on April 21, 2020. This resulted in a decrease in the number of patients seen in the outpatient clinic, colonoscopies being performed, and in-patient admissions for colorectal cancer during the pandemic.[8] Elective surgeries were canceled for an indefinite amount of time and emergency surgeries were performed under careful isolation and protocols all over the world.[9,10]

In this study, we aimed to investigate whether the pandemic had an effect on characteristics and outcomes of CRCs, their emergency presentations, and management in patients who underwent surgery during the pandemic compared to the pre-COVID era.

MATERIALS AND METHODS

This single-cancer retrospective cohort study was conducted in a tertiary care center. The research was approved by the institutional review and ethics board (February 01, 2021-54583).

Patients who underwent surgery for CRC were screened retrospectively from the institutional database. Patients were divided into two groups before and after 15 months of identification of "patient-zero" in Türkiye (11 March 2020). Patients who underwent colorectal stenting and those who were treated conservatively were excluded. Bowel obstruction was classified as a mild obstruction that allows the passage of the colonoscope; moderate obstruction that does not allow the passage of the scope without any systemic signs and severe obstruction that presents with systemic signs requiring urgent decompression. In addition to the study group, patients with moderate and severe obstructive CRCs who underwent surgery were identified and subgroup analysis was performed. Patient demographics, initial presentation characteristics, clinical outcomes, and pathological cancer stages were compared in both study groups.

Statistical analysis was performed with IBM SPSS v28 (Armonk, NY). Normally distributed data were presented as mean ± SD. Non-normally distributed data were in the median range. Categorical variables were compared with Fisher's exact test or Chi-square test. Continuous variables were compared with the independent t-test or Mann–Whitney U-test considering the normality. Statistical significance was accepted when $p<0.05$.

RESULTS

Overall, 215 patients underwent surgery for CRC adenocarcinoma during the 30 months (COVID: 107, pre-COVID: 108). The mean age was 59 for the pre-COVID group while it was 62 for the COVID group (p=0.16). Fifty-three patients (49%) were female in the pre-COVID group and 49 patients (45%) in the COVID group (p=0.73). Similarly, BMI (pre-COVID: 26.9 kg/m^2 and COVID: 26.1 kg/m^2; p=0.16) and the percentage of patients with comorbidities greater than or equal to the American Society of Anesthesiologists score 3 (pre-COVID: 15%, COVID: 16%; p=0.83) were comparable between two groups. In both groups, most of the patients presented with clinical T stages of 3 (pre-COVID: 39% vs. COVID: 31%) and 4 (pre-COVID: 40% vs. COVID: 42%) without any major distribution difference between the two groups (p=0.07). Clinical N positivity (74% vs. 67%; p=0.25) and number of patients with distant metastases were higher in the COVID group (5 [4.7%] vs. 1 [0.9%]; p=0.12) (Table 1).

Table 1. Comparison of the pre-operative demographic and clinical characteristics

Obstructive	Pre-COVID (n: 108)	COVID (n: 107)	p-value
Age (years), mean (SD)	59.9 (11.9)	62.3 (11.9)	0.16
Female sex, n (%)	53 (49.1%)	49 (45.8%)	0.73
BMI (kg/m^2), mean (SD)	26.9 (3.8)	26.1 (4.5)	0.16
ASA 3+, n (%)	17 (15.7%)	18 (%16.8%)	0.83
Clinical staging, n (%)			0.07
T1	8 (7.4%)	3 (2.8%)	
T2	13 (12%)	25 (23.4%)	
T3	43 (39.8%)	34 (31.8%)	
T4	44 (40.7%)	45 (42.1%)	
N1+, n (%)	73 (67.6%)	80 (74.8%)	0.25
M1+, n (%)	1 (0.9%)	5 (4.7%)	0.12

COVID: Coronavirus disease; SD: Standard deviation; BMI: Body mass index, ASA: American Society of Anesthesiologists.

Table 2. Comparison of the presentation characteristics

Obstructive	Pre-COVID (n: 108)	COVID (n: 107)	p-value
Tumor location, n (%)			0.007
Ascending colon	25 (23.1%)	24 (22.4%)	
Transverse colon	9 (8.3%)	3 (2.8%)	
Descending colon	7 (6.5%)	24 (22.4%)	
Sigmoid colon	52 (48.1%)	40 (37.4%)	
Rectum	15 (13.9%)	16 (15%)	
Emergency presentation, n (%)	27 (25%)	44 (41.1%)	0.008
Obstructive, n (%)	51 (47.2%)	74 (69.1%)	0.001
Time-to-treat (days), mean (SD)	38.9 (23.6)	36.9 (28.7)	0.6

COVID: Coronavirus disease, SD: Standard deviation.

Tumors of sigmoid colon and rectum were more commonly present in both groups. (pre-COVID: 52% vs. COVID: 52.4%; p=0.007). Patients who were admitted through the emergency department (41.1% vs. 25%, p=0.008) increased in the COVID era and the ratio of patients with obstructive tumors was higher (69.2% vs. 47.2%, p=0.001). The mean number of days from the diagnosis to treatment was similar between the two groups (pre-COVID: 38.9 vs. COVID: 36.9, p=0.6) (Table 2).

When the obstructive tumors were analyzed separately, there were 51 patients in the pre-COVID group vs. 74 patients in the COVID group. The surgical resection rate compared to diverting ostomy was similar between the two groups (pre-COVID: 90.1% vs. COVID: 89.1%, p=0.85). Patients underwent more laparoscopic surgery during the pre-COVID period although not statistically significant (pre-COVID: 90.1% vs. 82.4%, p=0.22). Mean operative time was higher during the COVID period although not statistically significant (pre-COVID: 154.1 min vs. COVID: 165.8 min, p=0.3) (Table 3).

The mean length of stay was similar between the two groups (pre-COVID: 8 days vs. COVID: 8.5 days, p=0.68). Complication rates were comparable (pre-COVID: 21.5% vs. COVID: 25.6%, p=0.6). According to Clavien–Dindo classification, number of patients presenting with a complication score higher than 3 were similar (pre-COVID: 11.7% vs. COVID: 12.1%, p=0.9). Anastomotic leakage rates (pre-COVID: 5.8% vs. COVID: 2.7%, p=0.37) were comparable. When 30-day post-operative results were compared, readmission rates (pre-COVID: 3.9% vs. COVID: 6.7%, p=0.49) and morbidity (pre-COVID: 5.8% vs. COVID: 4.0%, p=0.63) did not differ

Table 3. Perioperative results of the patients with obstructive tumors

Obstructive	Pre-COVID (n: 51)	COVID (n: 74)	p-value
Tumor location, n (%)			0.02
Ascending colon	8 (15.6%)	15 (20.2%)	
Transverse colon	7 (13.7%)	1 (1.3%)	
Descending colon	6 (11.7%)	18 (24.3%)	
Sigmoid colon	25 (49.1%)	28 (37.8%)	
Rectum	5 (9.8%)	12 (16.2%)	
Surgery, n (%)			0.85
Resection	46 (90.1%)	66 (89.1%)	
Diverting ostomy	5 (9.8%)	8 (10.8%)	
Surgical technique, n (%)			0.22
Laparoscopy	46 (90.1%)	61 (82.4%)	
Open	5 (9.8%)	13 (17.5%)	
Operative time (min), mean (SD)	154.1 (65.9)	165.8 (66.1)	0.3

COVID: Coronavirus disease, SD: Standard deviation.

Table 4. Postoperative results of the patients with obstructive tumors

Obstructive	Pre-COVID (n: 51)	COVID (n: 74)	p-value
Length of stay (days), mean (SD)	8 (5.6)	8.5 (5.4)	0.68
Complications, n (%)	11 (21.5%)	19 (25.6%)	0.6
Clavien Dindo 3+, n (%)	6 (11.7%)	9 (12.1%)	0.9
Anastomotic leakage, n (%)	3 (5.8%)	2 (2.7%)	0.37
30-day readmission, n (%)	2 (3.9%)	5 (6.7%)	0.49
30-day morbidity, n (%)	3 (5.8%)	3 (4.0%)	0.63
30-day mortality, n (%)	0 (0%)	0 (0%)	NA

COVID: Coronavirus disease; SD: Standard deviation.

Table 5. Pathological outcomes of the patients that underwent resection for the obstructive tumors

Obstructive	Pre-COVID (n: 46)	COVID (n: 66)	p-value
Pathological staging			0.95
I	2 (4.3%)	3 (4.5%)	
II	17 (36.9%)	21 (31.8%)	
III	25 (54.3%)	39 (59%)	
IV	2 (4.3%)	3 (4.5%)	

COVID: Coronavirus disease.

between two groups. There were no mortalities during the 30-day post-operative period (Table 4).

Pathological staging was comparable between the two groups (p=0.95) and the majority of patients in both groups were at advanced pathological stage (Stage III-IV rates in pre-COVID: 58.6% vs. COVID: 63.6%) (Table 5).

DISCUSSION

The global COVID-19 pandemic has significantly affected the way, colorectal cancer is diagnosed and treated. Appropriate triages have been recommended by surgical and gastroenterological societies.[11,12] Reduction of cancer-screening programs resulted in an overall reduction of diagnosis and referrals.[13,14] McLean et al. investigated whether COVID-19 had affected emergency general surgery admissions and found a significant reduction during the pandemic.[15] Several other studies presented similar results regarding reduction and delay in surgical treatments.[16-18] A survey related to CRC management showed that surgeons preferred to delay elective CRC surgeries during the pandemic.[18] This delay had impacts on all modalities of treatment for CRCs: Surgery, chemotherapy, and long-term radiotherapy.[19] However, in contrast, short-term radiotherapy and emergency surgery had an increased trend in some studies.[20,21] Moreover, some other studies reported that treatment plans were changed in favor of chemotherapy versus surgery and short-term therapy versus long-term therapy in order the avoid the risks associated with COVID-19.[22,23]

In our study, similar number of patients were treated for colorectal cancer with surgery during and before COVID-19 with comparable demographics. Clinical staging including lymph node positivity and distant metastases was higher in the COVID period although not significantly different between the two groups. Emergency presentations with obstruction were significantly higher during the COVID period as expected. Most of these patients had partial obstructive symptoms. However, when the time from the diagnosis to treatment was compared, patients treated during the COVID period were not at a significant disadvantage; in fact, time to treat has been lower although not statistically significant. The main reason is that in our institution, COVID-related wards and in-patient clinics were separate in terms of operation and physical workspace. The emergency surgery department and its physical spaces such as operating rooms, and wards, were used for both elective and emergency surgeries. Thus, we believe that a higher number of obstructive patients resulted in faster surgical management of CRCs compared to the pre-COVID era after the first admission although patients could be still presenting late to the hospital which could explain the statistical insignificance. Open surgery was more commonly preferred during the COVID era similarly due to the higher rate of obstructive patients and to prevent aerosol production during laparoscopy. Operative time was longer due to the increase in the number of protective precautions against COVID-19. When obstructive patients were separately analyzed, in-hospital stay, complication rates, 30-day readmis-

sion, morbidity, and mortality were not significantly different between two groups.

The main limitations of our article are that it is retrospective in nature representing a single-center experience without long-term oncological results, and it contains insightful information related to a single-center standardized approach in the pandemic. In addition, this study does not include patients who underwent colorectal stenting for palliation or as a bridge-to-surgery as the main focus of this study is to discuss whether the COVID pandemic has affected perioperative results of patients who are going under surgery.

Conclusion

In our study, we observed an increased obstructive symptoms in patients with CRCs who underwent surgery during the COVID-19 pandemic but there were no major differences in terms of perioperative complications, morbidity and mortality.

Ethics Committee Approval: This study was approved by the Istanbul University, Istanbul Faculty of Medicine Clinical Research Ethics Committee (Date: 01.02.2021, Decision No: 54583).

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ORİJİNAL ÇALIŞMA - *ÖZ*

Koronavirüs hastalığı 2019 pandemisi sırasında tıkayıcı kolorektal kanser hastalarının klinik sonuçları

Dr. Cemil Burak Kulle,[1] Dr. Berke Sengun,[1] Dr. Ali Fuat Kaan Gok,[2] Dr. Ilker Ozgur,[1] Dr. Adem Bayraktar,[1] Dr. Cemalettin Ertekin,[1] Dr. Alisan Berk Deniz,[1] Dr. Metin Keskin[1]

[1]İstanbul Üniversitesi, İstanbul Tıp Fakültesi, Genel Cerrahi Anabilim Dalı, İstanbul, Türkiye

[2]Hoca Ahmet Yesevi Uluslararası Türk-Kazak Üniversitesi, Kazakistan

AMAÇ: COVID-19 pandemisi, kolorektal kanserin (KRK) tanı ve tedavisi de dahil olmak üzere global olarak klinik hizmetlerin önemli bir kısmını etkiledi. Pandeminin zirve yaptığı ilk dönemde, sokağa çıkma yasağı uygulandı, elektif cerrahi ve poliklinik hizmetleri kısıtlandı. Bunun sonucunda kolonoskopi işlemlerinde ve hastaneye yatışta önemli bir azalış görüldü. Bu çalışmada, pandeminin tıkayıcı kolorektal kanserli hastaların hastaneye geliş özelliklerinde ve perioperatif sonuçları üzerine etkisini araştırmak hedeflendi.

GEREÇ VE YÖNTEM: Tek merkezli, retrospektif kohort olarak dizayn edilen bu çalışmada, yüksek hacimli, üçüncü basamak bir üniversite hastanesinde kolorektal adenokarsinom tanısı ile ameliyat edilen hastalar dahil edildi. Hastalar Türkiye'de COVID-19 tanısı alan ilk hastanın tanı tarihinden (18/03/2020) 15 ay önce ve sonra olmak üzere iki gruba ayrıldı. Hasta demografik bilgileri, ilk başvuru özellikleri, klinik sonuçlar ve patolojik veriler üzerinden karşılaştırıldı.

BULGULAR: Toplam 215 hasta kolorektal kanser ön tanısıyla 30 ay içinde ameliyat edildi. (COVID dönemi: 107, COVID öncesi: 108). Hasta demografik özellikleri, tümör yerleşimi ve klinik evreleme iki grup arasında benzerdi. COVID döneminde tıkayıcı KRK ile başvuran ($p<0.01$) ve acil başvuruda bulunan ($p<0.01$) hasta sayısı anlamlı olarak arttı. Fakat 30 günlük morbidite, mortalite ve patolojik sonuçlar arasında anlamlı fark yoktu ($p>0.05$).

TARTIŞMA: Çalışmada, pandemi dönemide acil başvuruda anlamlı artış ve elektif başvuruda azalma gözlense de COVID-19 döneminde ameliyat edilen hastalar postoperatif sonuçlar değerlendirildiğinde dezavantajlı değillerdi. Kolorektal kanserli hastaların acil başvuruları ile ilgili risklerin azaltılması ile ilgili yapılacak çalışmalar olumsuz sonuçların azaltılmasında etkili olacaktır.

Anahtar sözcükler: COVID-19; tıkayıcı tümörler; kolon kanseri; rektum kanseri; pandemi.

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