ORIGINAL ARTICLE

Acute appendicitis during coronavirus disease 2019 in Türkiye: Changes in clinical approach, treatment, and diagnosis modalities: A retrospective and cohort study

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ABSTRACT

BACKGROUND: The novel coronavirus disease 2019 (COVID-19) has resulted in major changes in health-care systems and emergency surgical interventions. Here, we examined patients with acute appendicitis who presented to emergency departments and compared diagnosis, treatment, and post-treatment processes before and during the pandemic period and investigated how the pandemic affected management of acute appendicitis.

METHODS: A national, multicenter, and cohort study model was designed that included patients older than 18 years of age diagnosed with acute appendicitis clinically and/or radiologically, with patients compared before (pre-pandemic period: January 1–April 30, 2019) and after (pandemic period: January 1–April 30, 2020) the pandemic. Our investigation included comparisons of pre-operative imaging methods, presence of plastron appendicitis/abscess, conservative/surgical approach, type of anesthesia given, laparoscopic/open surgical approach, bowel resection rates, drain insertion rates, and presence of post-operative complications

RESULTS: For the two study groups, 8972 patients from 69 centers were examined, with 4582 patients operated in the pre-pandemic period and 4234 patients operated in the pandemic period. During the pandemic period, 63.6% of patients underwent open surgery, whereas 34.4% had laparoscopic surgery. Although 60 patients (1.3%) requested non-operative follow-up in the pre-pandemic period, 94 patients (2.2%) requested this in the pandemic period. When conditions of patients were evaluated regardless of their own wishes, 114 patients (2.4%) before and 163 patients (3.8%) during the pandemic received non-operative follow-up.

CONCLUSION: Our study did not show the direct correlation between the application of COVID-19-related restrictions and the severity of acute appendicitis. Although non-operative management rates have been increased during the COVID-19 period, the incidences of both complicated and the uncomplicated appendicitis were similar during the COVID-19 crisis period. Given this information non-operative management can be employed for patients diagnosed with appendicitis.

Keywords: Acute appendicitis; COVID-19; emergency surgery; pandemic.

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INTRODUCTION

There have been major changes in health-care systems and emergency surgical interventions after declaration of the novel coronavirus disease 2019 (COVID-19) as a pandemic.[1,2] In many centers, surgical floors and intensive care units have been reserved for COVID-19 patients, with emergency rooms consisting mostly of COVID-19 patients.[3,4] Elective surgeries have been postponed and relatively emergent operations have been performed with a delay. In addition, non-COVID-19 patients had hesitations for hospital admissions.

After the first patient in Türkiye was diagnosed with COVID-19 in March 2020, protective measures were executed to fight against the outbreak and pandemic hospitals were established. There have been questions during this time about performing surgical interventions for acute appendicitis, which has an incidence of 7% whether there have been delays in admission of patients to hospital, and whether there have been changes in emergency surgeries.[5] At present, negative appendectomy rates remain around 2–14% despite the development of new modalities. During the pandemic, there have been some decrease in these negative results as a result of surgical delays.[6–9] Therefore, we hypotheses that there has been changes in diagnostic methods and surgical approach for patients diagnosed with appendicitis during COVID-19 period.

In this study, we aim to assess patients diagnosed with appendicitis presented to emergency department and compare diagnosis, treatment, and post-treatment processes before and during the pandemic period and investigate how the pandemic affected management of acute appendicitis.

MATERIALS AND METHODS

Study Design

This national, multicenter, and cohort study included patients older than 18 years of age who had been diagnosed with acute appendicitis clinically or radiologically. Data collection periods considered the date of the first COVID-19 identified per the World Health Organization (January 9, 2020) and the date of the first COVID-19 case identified by the Ministry of Health (March 11, 2020) (Fig. 1). Data were retrospectively queried from prospective database. Study data were collected at each included center under the leadership of the responsible researcher. Our work has been reported in line with the STROCSS criteria.[10] The approval of the Ethics Committee was obtained from the University of Başkent (approval no: KA20/151).

Patient Selection

Our primary aim was to reveal differences in the management of patients diagnosed with acute appendicitis during the COVID-19 pandemic compared with the pre-pandemic period. For this comparison, dates of the pandemic period were matched with the same period in 2019 (January 1 to April 30, 2020 vs. January 1 to April 30, 2019). Although the first case with a positive polymerase chain reaction test was detected in March 2020, the start date was not clear due to the possibility of undiagnosed cases before March 2020. To avoid statistically bias, the pandemic period included January 2020–April 2020 compared with January–April 2019 as the pre-pandemic period. All patients older than 18 years old and clinically or/and radiologically diagnosed with acute appendicitis were included in the present study. Diagnosis included questions on localization of pain from the umbilical region to the right iliac fossa, nausea-vomiting, and anorexia symptoms. Clinically, tenderness, rebound, and high fever in the right lower quadrant were evaluated. For laboratory parameters, leukocytosis and presence of a left shift in neutrophil count were checked.

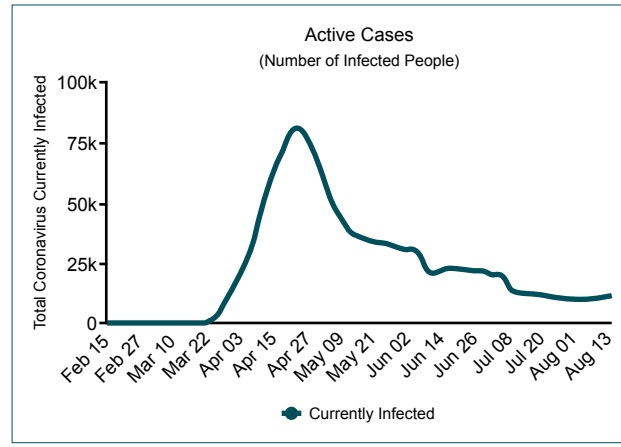

Figure 1. Active COVID-19 cases in our country.

Radiological imaging was performed to confirm the diagnosis after physical examination, with abdominal ultrasonography and/or computed tomography used as the radiological imaging method. Some centers only had one of these methods. Diagnosis of acute appendicitis was confirmed by pathology in operated patients.

Participating Institutions and Data Collection

All centers in Türkiye that provided emergency response to acute appendicitis were included in the study. The study was supported by our Colon and Rectum Surgery Society. Data were collected based on the ICD code for appendicitis by the local team at each participating institution from their database, with data entered fully anonymized to IBM SPSS Statistics software. Data from all institutions were merged into a main database.

Outcomes

Primary end-point of the study is the incidence of negative appendectomy rate during the pandemic period. Secondary end-points are the use of computed tomography (CT) scan

and incidence of complicated appendicitis during the pandemic period. Study parameters for comparison between the two groups included pre-operative imaging methods, presence of plastron appendicitis/abscess, conservative/surgical approach, type of anesthesia, laparoscopic/open surgical approach, bowel resection rates, drain insertion rates, and presence of post-operative complications.

Comorbidities were defined as chronic obstructive pulmonary disease, cardiovascular diseases, diabetes mellitus, obesity, and kidney failure.

Conservative approaches to treatment included intravenous antibiotic treatment and/or percutaneous drainage.

Statistical Analysis

Descriptive statistics are presented as counts and percentages for categorical variables and as mean and standard deviations for continuous variables. Differences between the two groups for continuous variables were assessed with the t test. Categorical variables were assessed with the Chi-square test or the Fisher exact test, where applicable. Differences among three groups for continuous variables were evaluated by one-way analysis of variance (ANOVA) or Kruskal–Wallis ANOVA, where applicable. When p-values by one-way ANOVA and Kruskal–Wallis ANOVA were shown to be statistically significant, the Tukey honestly significant difference test and the Dunn test were used to determine differences among groups. P<0.05 was considered significant. We also conducted subgroup analysis for each month results. We performed statistical analysis using SPSS for Windows 11.5. The study was structured according to Strengthening the Reporting of Observational Studies in Epidemiology guidelines for observational studies.

RESULTS

Patients were examined before (January 1–April 30, 2019) the pandemic (pre-pandemic group) and after (January 1–April 30, 2020) the pandemic (pandemic group), with 4655 patients in the pre-pandemic group and 4317 patients in the pandemic group. In total, there were 8972 patients from 69 centers. Since patient demographic characteristics were not relevant to the study and effect the outcomes (Table 1). Therefore, the demographic data were not collected and compared in the present study.

Ultrasonography was performed in 2893 patients (62.1%) in the pre-pandemic group and in 2314 patients (53.6%) in pandemic group (Fig. 2). In the pre-pandemic group, 2480 patients (53.2%) had CT scans (Fig. 3), whereas 2661 patients (61.6%) in the pandemic group had CT scans. In particular, in April 2020, the month when the pandemic peaked, compared with April 2019, there was a decrease in ultrasonography rates. Ultrasonography was performed in 63.1% of patients in the pre-pandemic group and in 47.2% of patients in the pandemic group (p<0.001). When we analyzed April with regard to CT scans, 55.4% of patients in the pre-pandemic group and 65.7% of patients in the pandemic group received CT scans (p<0.001). In April 2020, due to the pandemic peak, the number of ultrasonography decreased, whereas number of CT increased. When data were compared, there was a decrease in the percentage of patients who underwent ultrasonography during the pandemic period and an increase in the percentage of patients who had CT scans.

With regard to the presence of plastron appendicitis in imaging of patients, there was no significant difference between the pre-pandemic period (3.4%) and the pandemic period (2.1%). Similarly, when rates of periapendicular abscess were compared, no significant difference was found (9.3% vs. 11.5%) (p<0.001) (Fig. 4).

In the pre-pandemic period, 4582 patients (98.4%) had operations, with 4234 patients (98.1%) having operations in the pandemic period. Comparison of patients in terms of open or laparoscopic surgery is shown in Figure 5. In the pre-pandemic period, 63.4% of patients had open surgery and 35% had laparoscopic surgery (p<0.001). During the pandemic period, 63.6% of the patients had open surgery and 34.4% had laparoscopic surgery. No significant difference was found between pre-pandemic and pandemic periods for the indications for bowel resection and drainage performed during the operation. When the "peak" period of April was examined in terms of operation type, the rate of open operations increased from 61.4% to 70.3% (pre-pandemic period vs. pandemic period [p<0.001]). While open operation rates increased, laparoscopic surgery rates decreased from 38% to 24.8% (p<0.001) (Fig. 6).

When operated patients with general anesthesia were compared with those with spinal anesthesia, rates of spinal anesthesia increased during the pandemic period (6.5% vs. 13.2%) (p<0.001). The rate of spinal anesthesia during the pandemic period increased to 13.2% on average, reaching 20.8% in April 2020. General anesthesia rates decreased from 93.5% to 79.2% in April 2020 (p<0.001) (Fig. 7).

Although 60 patients (1.3%) requested non-operative follow-up in the pre-pandemic, 94 patients (2.2%) requested this in the pandemic period. When the current conditions of the patients were evaluated regardless of their own wishes, 114 patients (2.4%) before the pandemic and 163 patients (3.8%) during the pandemic were followed-up nonoperatively. In April, the peak month of the pandemic, patient desire not to be operated significantly increased. Although 1.5% of patients did not want an operation in April 2019, 4.1% of patients did not want an operation in April 2020. There was a significant difference in the percentage of patients without surgery in April (2.3% in 2019 vs. 7.3% in 2020) (p<0.001) (Fig. 8).

Table 1. Comparison of demographics and preoperative and postoperative outcomes before and after the COVID-19 pandemic period

	Pre-pandemic period, April 2019 (n=1195)	Pandemic period, April 2020 (n=740)	p-alue
Age, years	34.9±14.4	34.5±13.8	0.586
Onset of symptoms, hours	24 (1–240)	24 (1–240)	0.904
WBC, x10^9/L	13.2±4.4	13.9±6.2	0.003
RDW, x10^{12}/L	13.4±1.6	13.2±1.8	0.033
MPV, fL	9.4±1.3	9.3±1.3	0.776
Thrombocytes, x10^9/L	258.332±73931	258173±76901	0.965
COVID-19 PCR, n (%)		65 (9.3)	
Comorbidities,	120 (10%	94 (12.7)	0.070
Sonographic positivity (+)	525 (43.9)	247 (33.4)	<0.001
Abdominal/pelvic CT sign (+)	626 (52.4)	456 (61.6)	<0.001
Plastron appendicitis	39 (3.3)	21 (2.8)	0.610
Periappendiceal abscess	112 (9.4)	98 (13.3)	0.008
Operative approach, n (%)			<0.001
Open	721 (60.3)	520 (70.4)	
Laparoscopic	454 (38)	183 (24.8)	
Nonoperative	20 (1.7)	36 (4.9)	
Type of anesthesia, n (%)			<0.001
General	1099 (92.0)	555 (75.3)	
Spinal	76 (6.4)	146 (19.8)	
Nonoperative	20 (1.7)	36 (4.9)	
Bowel resection, n (%)	12 (1)	6 (0.8)	0.651
Drain placement, n (%)	225 (18.8)	147 (19.9)	0.574
Length of hospital stay, days	2 (1–20)	2 (1–22)	0.520
Nonoperative follow-up (patient requested), n (%)	18 (1.5)	30 (4.1)	<0.001
Nonoperative management, n (%)	20 (1.7)	36 (4.9)	<0.001
Postoperative complication, n (%)	49 (4.1)	39 (5.3)	0.230

MPV: Mean platelet volume; PCR: Polymerase chain reaction; RDW: Red cell distribution width; WBC: White blood cell count. The values were given mean±standard deviation or number (%) as indicated above. Onset of symptoms and length of hospital stay were reported as median (range).

Analyzed post-operative complications included abscess development, ileus, perforation, and wound infection. When each situation was compared with each other, no significant difference was found between the occurrence percentages. Therefore, complications are only compared by year. Complications were observed in 178 patients (3.9%) in the pre-pandemic period and in 209 patients (4.9%) in the pandemic period, showing no significant operation-related complication between study periods. When the month of April, the pandemic peak was compared, complications were seen in 49

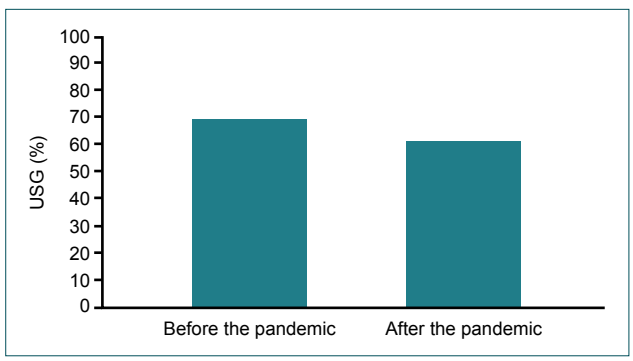

Figure 2. Percentage of ultrasonography.

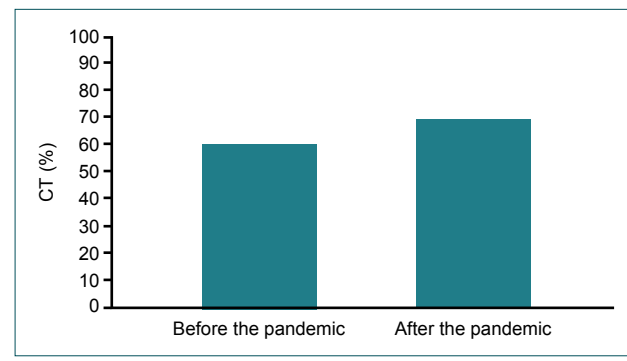

Figure 3. Percentage of computed tomography.

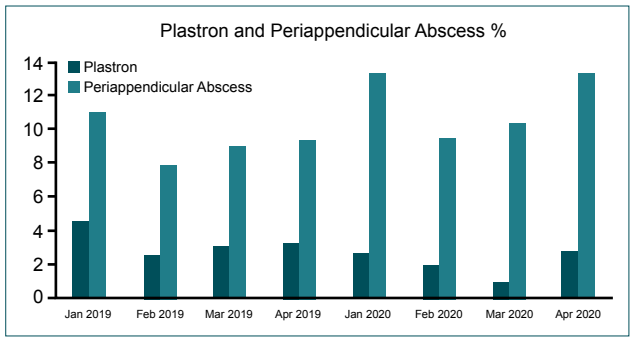

Figure 4. Plastron appendicitis and periappendicular abscess rates.

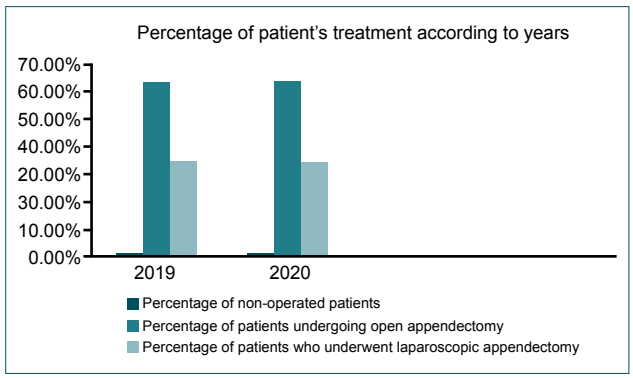

Figure 5. Percentage of patient treatment according to study periods.

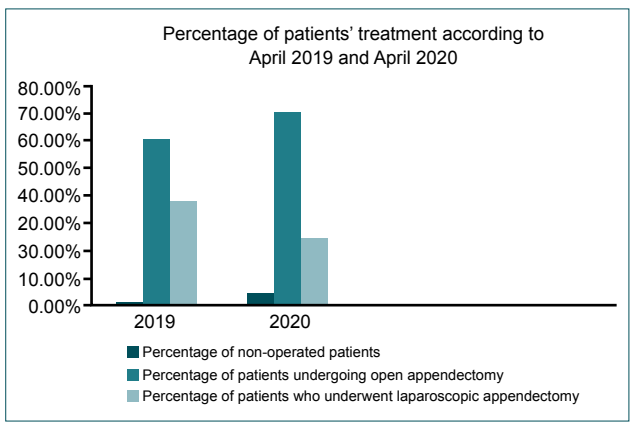

Figure 6. Percentage of patient treatment in April 2019 and April 2020.

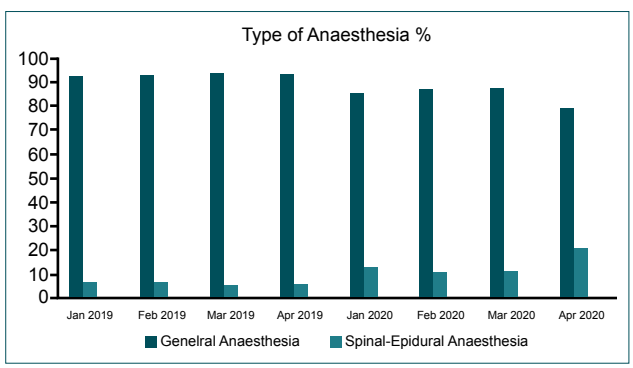

Figure 7. Type of anesthesia.

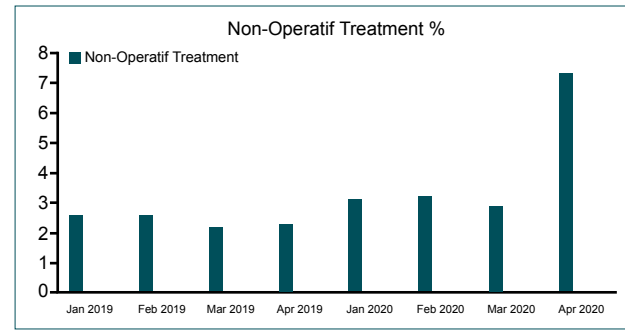

Figure 8. Non-operative treatment.

Table 2. Comparison of pathology results

	2019 n (%)	**2020 n (%)**
Normal pathology	283 (6.1)	260 (6)
Acute appendicitis	4004 (86)	3608 (83.6)
Perforated appendicitis	166 (3.6)	148 (3.4)
Neoplasia	75 (1.6)	41 (0.9)
	April 2019 n (%)	**April 2020 n (%)**
Normal pathology	87 (7.3)	29 (3.9)
Acute appendicitis	1022 (85.5)	591 (79.9)
Perforated appendicitis	37 (3.1)	38 (5.1)
Neoplasia	21 (1.8)	5 (0.7)

patients (1.1%) in the pre-pandemic period and 39 patients (0.9%) in the pandemic period, with no difference found between the two periods.

Pathology comparisons between groups are summarized in Table 2. Pathology results showed that most operated patients had acute appendicitis. There was a decrease in the percentage of patients without acute appendicitis during the pandemic period, which was thought to be due to better selection of an operation for the treatment of patients. The increase in the percentage of patients reported as perforated during the pandemic period suggests that the COVID-19 pandemic may have led to delay in hospital admission or operation. When compared only in April, the percentage of patients whose pathology resulted in favor of appendicitis was 89.1%. This could have been because of more careful selection of patients for an operation.

DISCUSSION

With the first patient in Türkiye was diagnosed with COVID-19 in March 2020, changes in emergency surgical approaches occurred for both patients and physicians.[5,11] These changes were also in acute appendicitis cases, which is the most common emergency procedure. Perforation rates in-

creased due to longer durations between start of symptoms and admission to hospital and the necessity of investigating for COVID-19 as well as acute abdomen. Likewise, negative appendectomy rates decreased from 6.5% to 3.9% due to referral of non-operative approaches for uncertain diagnoses.[11,12] Although no statistically significant difference was found, the decrease in acute appendicitis cases was inversely proportional to the increase in COVID-19 cases, a finding concordant to a previous study from Tankel et al.[11]

The present study showed an increase in non-operative management rates which is similar to the findings in other studies. Non-operative approaches for patients without confirmation of perforation increased from 2.5% to 7.5% during COVID-19 pandemic.[9,11,12] This showed that a non-operative approach was more often applied during pandemic, which is usually preferred by surgeons. Non-operative treatments became more apparent for patients without certain indications, for both COVID-19-positive patients and patients who were negative or suspicious for COVID-19. In a study from Lei and associates[13] that included 34 patients, they found that, in patients who had no symptoms before surgery who became COVID-19-positive afterward, the mortality rate was 20%. This is thought to be associated with operation, intubation, and post-operative contamination despite protective measures. Publications reporting increased infection rates in complicated operations can explain preference of non-operative treatments. In addition to risk to patients, the operating team is also at risk. Contamination may happen in several ways, but the greatest risk is during tracheal intubation.

In this context, if the operation can be postponed "without significantly increasing the risk to the patient," this seems to be the best option. There are several proposals for non-operative treatment or minimally invasive procedures for non-traumatic abdominal emergencies. There are several studies on non-operative treatment for acute calculous cholecystitis, acute appendicitis (with periapendicular abscess or even complicated), acute diverticulitis with abscesses, uncomplicated intestinal obstruction, and even perforated peptic ulcers (with local disease-without diffuse peritonitis).[14,15] For these treatments, the patient should have no diffuse peritonitis and there should be adequate control of abdominal infections.

Another important point is that the evolution of COVID-19 in these cases is not known. Some factors of poor prognosis (such as age, chronic obstructive pulmonary disease, cardiovascular diseases, diabetes mellitus, obesity, and delayed admission[16–18]) are known; however, there is no "crystal ball" to predict the evolution of a given patient. A patient could develop respiratory failure, making operative procedures difficult or even impracticable and losing timing of the operative treatment. However, non-operative treatments can also have serious consequences. In addition to treatment approaches, steps of diagnosis have also changed during the pandemic. Although medical history and examination are almost enough and imaging studies are used in uncertain cases, rates of evaluation with CT scans have increased from 55% to 65% during the pandemic. This could be explained by surgeons requesting imaging studies more often to clarify the diagnosis.[17]

CT is highly sensitive at detecting acute appendicitis and is known to reduce the rate of negative appendicectomies significantly, making routine CT imaging, perhaps with a lower radiation dose, a future consideration.[19] A delay in patient admission to the hospital has been reflected in both increased perforated appendicitis rates and positive finding rates in CT images.[2] These results are congruent with the hypothesis that people are postponing visits to the emergency room during the pandemic until their symptoms become severe. Because of COVID-19, neither the analysis of clinical signs nor the analysis of laboratory signs, such as hyperleukocytosis or increased C-reactive protein levels and insufficient for diagnostic certainty. The combination of these data in composite scores can increase the overall performance, but none of the current scores for diagnosis perform well enough to assure a positive or negative diagnosis.

The practice of open surgery with spinal anesthesia to avoid tracheal intubation and because of concern about an increased chance of contamination in laparoscopy due to gas insufflation may explain the decrease of laparoscopic surgery rate from 35% to 24.8%. Concerns were raised by clinicians on risks of laparoscopic operations because they are aerosol-generating procedures. This change in practice did not result in a longer length of hospital stay for patients with appendicitis. A preference of open surgery can be explained because of the possibility of contagion with peritoneal fluid and difficulty in controlling the air in the abdomen with laparoscopic procedures. Aerosol-generating procedures such as tracheal intubation and extubation pose a potential risk to healthcare workers because of the possibility of airborne transmission of infection.

Although no statistically significant difference was found, there was a decrease in acute appendicitis cases inversely proportional to increases in COVID-19 cases, and this was concordant with a previous study by Tankel et al.[11]

There are several limitations to our study, which are due to its retrospective study design and the characteristics of a multicenter study. Study centers were selected based on availabilities of daily elective surgeries and daily acute care surgery. Our retrospective analysis utilized ICD codes to identify every patient with the diagnosis of uncomplicated and complicated acute appendicitis. However, it is possible that some patients may not have been captured in our cohort.

Conclusion

Our study did not show the direct correlation between the application of COVID-19-related restrictions and the severity

of acute appendicitis. Although non-operative management rates have been increased during the COVID-19 period, the incidences of both complicated and the uncomplicated appendicitis were similar during the COVID-19 crisis period. Given this information, non-operative management could be employed for patients diagnosed with appendicitis during and also after COVID-19 period.

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Ethics Committee Approval: This study was approved by the Başkent University Ethics Committee (Date: 27.04.2020, Decision No: KA20/151).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: Ş.E., M.A.K., F.Y.K.; Design: Ş.E., F.Y.K.; Supervision: M.A.K., Ş.E., F.Y.K.; Resource: Ş.E., F.Y.K.; Data: Ş.E., TSCRS Acute Apandicitis Working Group; Analysis: A.H.E., Ş.E., M.A.K.; Literature search: B.G., İ.A.T., O.B., N.F.Y.; Writing: Ş.E., M.A.B., C.B.K.; Critical revision: V.A., H.Y., O.Y.

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REFERENCES

1. Andersen KG, Rambaut A, Lipkin WI, Holmes EC, Garry RF. The proximal origin of SARS-CoV-2. Nat Med 2020;26:450–2. [CrossRef]
2. Romero J,Valencia S, Guerrero A. Acute appendicitis during coronavirus disease 2019 (COVID-19): Changes in clinical presentation and CT findings. J Am Coll Radiol 2020;17:1011–3. [CrossRef]
3. Horton R. Offline: COVID-19 and the NHS-a national scandal. Lancet 2020;395:1022. [CrossRef]
4. COVID Surg Collaborative. Mortality and pulmonary complications in patients under going surgery with perioperative SARS-CoV-2 infection: An international cohort study Lancet 2020;396:27–38.
5. Javanmard-Emamghissi H, Boyd-Carson H, Hollyman M, Doleman B, Adiamah A, Lund JN, et al. The management of adult appendicitis during the COVID-19 pandemic: An interim analysis of a UK cohort study. Tech Coloproctol 2021;25:401–11. [CrossRef]
6. SCOAP Collaborative, Cuschieri J, Florence M, Flum DR, Jurkovich GJ, Lin P, et al. Negative appendectomy and imaging accuracy in the Washington State surgical care and outcomes assessment program. Ann Surg 2008;248:557–63. [CrossRef]
7. Raman SS, Osuagwu FC, Kadell B, Cryer H, Sayre J, Lu DS. Effect of CT on false positive diagnosis of appendicitis and perforation. N Engl J Med 2008;358:972–3. [CrossRef]
8. Coursey CA, Nelson RC, Patel MB, Cochran C, Dodd LG, Delong DM, et al. Making the diagnosis of acute appendicitis: Do more preoperative CT scans mean fewer negative appendectomies? A 10-year study. Radiology 2010;254:460–8. [CrossRef]
9. Raja AS, Wright C, Sodickson AD, Zane RD, Schiff GD, Hanson R, et al. Negative appendectomy rate in the era of CT: An 18-year perspective. Radiology 2010;256:460–5. [CrossRef]
10. Agha R, Abdall-Razak A, Crossley E, Dowlut N, Iosifidis C, Mathew G, et al. The STROCSS 2019 guideline: Strengthening the reporting of cohort studies in surgery. Int J Surg 2019;72:156–65. [CrossRef]
11. Tankel J, Keinan A, Blich O. The decreasing incidence of acute appendicitis during COVID-19: A retrospective multi-centre study.World J Surg 2020;44:2458–63. [CrossRef]
12. Kelly ME, Murphy E, Bolger JC, Cahill RA. COVID-19 and the treatment of acute appendicitis in Ireland: A new era or short-term pivot? Colorectal Dis 2020;22:648–9. [CrossRef]
13. Lei Y, Zhang HW, Yu J, Patlas MN. COVID-19 infection: Early lessons. Can Assoc Radiol J 2020;71:251–2. [CrossRef]
14. Janssen ER, Hendriks T, Natroshvili T, Bremers AJ. Retrospective analysis of non-surgical treatment of acute cholecystitis. Surg Infect (Larchmt) 2020;21:428–32. [CrossRef]
15. Ross SW, Lauer CW, Miles WS, Green JM, Christmas AB, May AK, et al. Maximizing the calm before the storm: Tiered surgical response plan for novel coronavirus (COVID-19). J AmCollSurg 2020;230:1080–109.
16. COVID Surg Collaborative. Global guidance for surgical care during the COVID-19 pandemic. Br J Surg 2020;107:1097–103. [CrossRef]
17. Center for Systems Science and Engineering (CSSE) at Johns Hopkins University. COVID-19 Dashboard; 2020. Available from: https://www.coronavirus.jhu.edu/map.html. Accessed Apr 18, 2020.
18. Correia MI, Ramos RF, Von Bahten LC. The surgeons and the COVID-19 pandemic. Rev Col Bras Cir 2020;47:e20202536. [CrossRef]
19. Kim K, Kim YH, Kim SY, Kim S, Lee YJ, Kim KP, et al. Low-dose abdominal CT for evaluating suspected appendicitis. N Engl J Med 2012;26;366:1596–605. [CrossRef]

ORİJİNAL ÇALIŞMA - *ÖZ*

Türkiye'de COVID-19 pandemi döneminde akut apandisit: Klinik uygulamalarda, tanı ve tedavi modalitelerinde değişiklikler, geriye dönük kohort çalışması

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AMAÇ: COVID-19 pandemisi, sağlık sistemlerinde ve acil cerrahi müdahalelerde önemli değişikliklere neden olmuştur. Bu çalışmada, acil servislere başvuran akut apandisitli hastaları inceleyerek pandemi öncesi ve pandemi döneminde tanı, tedavi ve tedavi sonrası süreçleri karşılaştırılmış ve pandeminin akut apandisit tedavisini nasıl etkilediğini araştırılmıştır.

GEREÇ VE YÖNTEM: Klinik ve/veya radyolojik olarak akut apandisit tanısı almış 18 yaşından büyük hastalar, pandemi öncesi dönem (1 Ocak–30 Nisan 2019) ve pandemi dönemi (1 Ocak–30 Nisan 2020) olarak iki gruba ayrılmıştır. Çalışmada ameliyat öncesi görüntüleme yöntemleri, plastron apandisit/apse varlığı, konservatif/cerrahi yaklaşım, verilen anestezi türü, laparoskopik/açık cerrahi yaklaşım, bağırsak rezeksiyonu oranları, dren yerleştirme oranları ve ameliyat sonrası komplikasyon varlığı karşılaştırılmıştır.

BULGULAR: İki çalışma grubu için 69 merkezden 8972 hasta incelenmiştir, 4582 hasta pandemi öncesi dönemde ve 4234 hasta pandemi döneminde ameliyat edilmiştir. Pandemi döneminde hastaların %63.6'sına açık cerrahi, %34.4'üne ise laparoskopik cerrahi uygulanmıştır. Pandemi öncesi dönemde 60 hasta (%1.3) ameliyatsız takip talebinde bulunurken, pandemi döneminde 94 hasta (%2.2) bunu talep etmiştir. Hastaların durumları kendi istekleri dışında değerlendirildiğinde, pandemi öncesinde 114 hasta (%2.4) ve pandemi sırasında 163 hasta (%3.8) ameliyatsız takip almıştır.

TARTIŞMA: Çalışmamız, COVID-19 ile ilgili kısıtlamaların uygulanması ile akut apandisit şiddeti arasında doğrudan bir ilişki göstermemiştir. COVID-19 döneminde ameliyatsız tedavi oranları artmış olsa da, COVID-19 kriz döneminde hem komplike hem de komplike olmayan apandisit insidansları benzerdir. Bu bilgiler göz önüne alındığında, apandisit teşhisi konan hastalarda ameliyatsız yönetim uygulanabilir.

Anahtar sözcükler: Acil cerrahi; akut apandisit; COVID-19; pandemi.

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