ORIGINAL ARTICLE

A comparison of patients who have appendectomy during the COVID-19 pandemic period with the period before the pandemic

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ABSTRACT

BACKGROUND: This study aims to compare the waiting and operating times of the patients who applied to our hospital with the diagnosis of acute appendicitis (AA) during the pandemic, how the process was managed in terms of AA and other data of the patient compared to the pre-pandemic period.

METHODS: A retrospective cohort analysis was performed among patients who were hospitalized in the Fatih Sultan Mehmet Training and Research Hospital General Surgery Clinic with a pre-diagnosis of AA. For this purpose, two groups were formed. Group 1: It comprised patients who were operated between March 11 and June 1, 2020; Group 2: It comprised patients who were operated between March 11 and June 1, 2019, with a pre-diagnosis of AA.

RESULTS: Forty-six patients in Group 1 and 79 patients in Group 2 were operated with the pre-diagnosis of AA. There was no difference between groups in terms of pre-operative symptom durations or surgery waiting times.

CONCLUSION: During the COVID-19 pandemic, significant decrease observed in the number of patients operated because of AA can be interpreted as the avoidance of patients from applying to the hospital with the concern of infection. Moreover, it may suggest that uncomplicated cases undergo spontaneous resolution; however, there is a requirement for further research to support this assumption and define the criteria for this condition by including a level of scientific evidence.

Keywords: Appendectomy; COVID-19 pandemic; laparoscopy.

INTRODUCTION

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection, which was first detected in December 2019, has rapidly spread and was identified as a global pandemic in a short time period. Because no effects as destructive and intense as those caused by Severe Acute Respiratory Syndrome (SARS)-CoV-2 have ever been seen in any country until this pandemic, its consequences on health resources worldwide are incalculable.[1] The majority of the literature on COVID-19 published to date is on the transmission characteristics, pathogenesis, treatment options, and patient outcomes of the disease. There are many issues that required to be investigated, that is, its effects on other areas of medicine, including general surgery.

The acute difficulties encountered during the pandemic include viral exposure, respiratory system disease, increased emergency room admissions, and high number of inpatients.[2] Moreover, for patients who are scheduled for surgery, the

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risk of being infected with COVID-19 increases with the operation to be performed. In the publication that examined the perioperative morbidity of 1128 cases published in The Lancet, surgeries performed during the pandemic process result in the high pulmonary complications and mortality.[3] Therefore, it is necessary to design and implement algorithms that are based on patient safety and will help the correct selection of patients to be operated. In a classification prepared according to the urgency of surgical indications, the American Association of Surgeons presents appendectomy among emergency operations that must be performed within 24 h.[4]

AA is one of the most common intra-abdominal conditions with a lifelong incidence of 9.0% and is the most common emergency surgery performed by surgeons worldwide.[5] Although conservative antibiotic therapy is advocated as first-line treatment in selected cases, surgery is still considered the gold standard because of the risk of recurrence of up to 40%. It is important to maintain the diagnostic process as short as possible to prevent complications of appendicitis. In many studies, a positive relationship was reported between the time interval from the onset of symptoms to the operation and the risk of perforation; it was seen that the prolongation of the time resulted in complicated appendicitis and post-operative morbidity.[6,7]

Despite its known advantages, laparoscopic surgery is not the preferred method because there is a worldwide concern about the transmission of the virus by aerosol at the onset of the pandemic.[8] However, it was reported that laparoscopic methods can be used safely after it is ensured that the virus cannot be produced from samples obtained from the peritoneal fluid.[9]

In this study, we planned to report our general clinical approach to patients with acute appendicitis (AA) who applied to our clinic during the pandemic process and to compare the time of admission to the hospital and the time of surgery with the previous periods.

MATERIALS AND METHODS

A total of 125 patients who were admitted to the emergency service of Fatih Sultan Mehmet Training and Research Hospital with the complaint of abdominal pain and were operated with a pre-diagnosis of AA as a result of the general surgery consultation were included in this study. The patients were divided into two groups:

Group 1: 46 patients who were operated between March 11 and June 1, 2020.

Group 2: 79 patients who were operated between March 11 and June 1, 2019.

Diagnosis of AA was made because of anamnesis (pain in the right lower quadrant), physical examination results (sensitivity in the right lower quadrant and rebound), and laboratory and imaging tests (ultrasound or computed tomography [CT]). After the diagnosis of AA, an American Society of Anesthesiologists (ASA) score was obtained after consulting an anesthesiologist.

Patients with COVID-19 (+) based on the pre-operative low-dose thoracic CT were taken to the operating room isolated for COVID-19, and the entire team was included in the operation with personal protective equipment. A polymerase chain reaction (PCR) test was applied to patients whose thoracic CT images were only suspicious, but the PCR results were not waited for operation.

Considering the risk of virus spread with laparoscopy and intubation at the beginning of the pandemic, Mc Burney appendectomy was performed on the patients along with spinal anesthesia and sedo-analgesia. However, in the later stages of the pandemic, the cases were started to be operated laparoscopically again.

Sex, age, pathological diagnosis, thoracic CT status for COVID-19 diagnosis, PCR test results, ASA score, type of anesthesia and operation, early post-operative complications, time from the onset of first symptom to arrival at the hospital, time from admission to the hospital to operation, length of stay, and surgical finding (simple or complicated appendicitis) were evaluated from patient files.

Perforation of the appendix, empyema or abscess formation, and associated peritonitis were defined as complicated appendicitis while appendix inflammation alone was defined as simple appendicitis.[10]

Informed consent forms were signed by all patients. Study approval was obtained from the ethics committee of the hospital.

Statistical Methods

A statistical software package (SPSS 21 Inc., Chicago, IL, USA) was used for biostatistical analysis. The data obtained from the patients participating in the study were expressed as mean, standard deviation values, and percentages where appropriate. The data distribution was verified with the Kolmogorov–Smirnov test. Comparison of the parametric data between independent groups was made using the one-way analysis of variance test. Non-parametric tests were performed using the Kruskal–Wallis H test. Categorical groups were compared using the Chi-square test.

RESULTS

Note that 46 patients who were operated between March 11 and June 1, 2020, and 79 patients who were operated between March 11 and June 1, 2019, were included in the

Table 1. Demographic and operational data

	Group 1 (n=46)	Group 2 (n=79)	Total (n=125)	p-value
	n (%)	n (%)	n (%)	
Gender				
Female	7 (15.2)	28 (35.4)	35 (28.0)	0.012[a]
Male	39 (84.8)	51 (64.6)	90 (72.0)	
Age	33.7	37.1	35.8	0.189[b]
ASA				
1	32 (69.6)	39 (49.4)	71 (56.8)	0.06[a]
2	14 (30.4)	33 (41.8)	47 (37.6)	
3	0	6 (7.6)	6 (4.8)	
4	0	1 (1.3)	1 (0.8)	
Type of operation				
Open	32 (69.6)	3 (3.8)	35 (28.0)	0.00[a]
Laparoscopic	14 (30.4)	76 (96.2)	90 (72.0)	
Type of anesthesia				
General	17 (37.0)	77 (97.5)	79 (63.2)	0.00[a]
Regional	29 (63.0)	2 (2.5)	46 (36.8)	
Operation finding				
Simple	37 (80.4)	55 (69.6)	92 (73.6)	0.132[a]
Complicated	9 (19.6)	24 (30.4)	33 (26.4)	

[a]Chi-Square Tests, [b]One-way Anova.

study. The mean age of the patients was 35.8 and the two groups were similar. Male patients were in the majority in both groups; in Group 1, the distribution of male to female ratio was significantly in favor of male patients. The demographic data of the patients are given in Table 1.

When the patients were evaluated in terms of type of operation, we reported that mostly open surgery was performed in Group 1, while laparoscopic surgery was mostly performed in Group 2 (laparoscopic surgery 30.4%, 96.2%, p=0.00).

When compared in terms of type of anesthesia, more spinal anesthesia was preferred in Group 1 and more general anesthesia was preferred in Group 2 (general anesthesia 37%, 97.5%, p=0.00). Both groups were similar in terms of simple or complicated appendicitis in operative findings (Table 1).

In Table 2, the patients were compared in terms of duration from the onset of symptoms to the admission to hospital and in terms of duration from the admission to hospital to the time of surgery. The mean duration from the onset of symptoms to the admission to hospital was 22.54 h, the duration to the time of surgery was 12.31 h, and both groups were similar in terms of these parameters. The length of stay in the hospital was similar in both groups.

DISCUSSION

In this study, where we examined the clinical approach to AA cases during the pandemic process and compared them in the previous periods, we reported that the hospital admission process and the operation processes of the patients did not change; however, the anesthesia and operation methods changed in AA cases. We performed open appendectomy under spinal anesthesia at a higher rate during the pandemic process.

Reasons such as not knowing the date when the COVID-19 pandemic will end and the exact treatment methods, being exposed to a constant flow of information about the pandemic and its effects, decrease in social relationships and isolation can reduce the sense of security in people, increase fear of death and negatively affect the mental health of individuals. Consequently, symptoms such as anxiety, depression, fear, stress, and sleep problems are more common.[11] In the SARS outbreak, similar conditions were experienced with a rate between 10% and 18%.[12] During the COVID-19 pandemic, people with the high health concerns can cause crowds by visiting hospitals more frequently. Another group with the high anxiety, however, applies less often, as they consider hospitals as a source of contamination. During this period, there may be patients with AA that requires emergency surgery who are anxious about coming to hospital and try to manage their abdominal pain complaints at home with symptomatic treatments. Assuming this hypothesis, the duration between the onset of symptoms and the time of surgery during the pandemic was compared with the previous year in patients operated for AA.

Table 2. Comparison of properties between groups

	Group 1 (n=46)	Group 2 (n=79)	Total (n=125)	p-value
Admission time (hours)	20.1	23.97	22.54	0.310[a]
Surgery time (hours)	12.4	12.24	12.31	0.875[a]
Hospitalization time (days)	1.67	1.92	1.83	0.233[a]

[a]One-way Anova.

In a consensus statement published by the European Association of Endoscopic Surgery in 2015, it was suggested that in-hospital delay up to 12/24 h is safe in simple AA and does not increase complications.[13] Another recent literature suggests that a late appendectomy will not increase morbidity and appendicitis can be semi selectively managed.[14–16] However, Ditillo et al.[17] showed that the risk of developing complications increases over time in patients with AA and it is not safe to delay appendectomy. Busch et al.[18] reported that a delay in hospital for >12 h is an independent risk factor for perforation. In our study, no difference was reported between the time of admission to the hospital and the time of operation in comparison of two periods.

In particular, in the early days of the pandemic, it was not known whether a surgeon is exposed to aerosolized viral particles by laparoscopy. In a case report published in Annals of Surgery, it was reported that COVID-19 was reported in the PCR examination of peritoneal fluid;[19] CO_2 insufflation used in laparoscopy increased the aerosol amount of energy devices. Although these aerosols remained in the abdomen during laparoscopy, it was thought that it could spread to a large area in the operating room when the patient's abdomen was desufflated (termination of the pneumoperitoneum).[20,21] Because the same energy devices are used in open surgery, this risk is not specific to laparoscopy. In open surgery, studies of viral transmission through surgical smoke were studied through HPV. No evidence of viral infection was demonstrated in cultures made with surgical smoke collected during the treatment of laryngeal papillomata.[22] In these days when the COVID-19 pandemic is still ongoing, the American College of Surgeons states that "there are not enough data to recommend an open or laparoscopic approach," while the Royal College of Surgeons acknowledges that laparoscopy should only be considered in certain cases and the risk cannot be clearly demonstrated. Along with this information, we performed open appendectomy to patients as a standard in the 1st months of the pandemic in our own clinic, but later we returned to laparoscopy.

Laparoscopic appendectomy is superior to open appendectomy in terms of the low analgesic requirement, low incidence of wound infection, faster recovery and shorter hospital stay, and overall increased clinical comfort and less morbidity rates. In different studies, while surgical wound site infections after laparoscopic appendectomy are ~4.5%, these rates increase up to 22% after open appendectomy.[23] In our series, no statistically significant difference was observed between the two periods and the two techniques in terms of complications. Schmelzer et al.[24] and Costa-Navarro et al.,[25] and in the comparisons made by certain other researchers, the length of hospital stay is 2–2.8 days for the laparoscopic approach and 2.8–3.8 days for the open surgery approach.[26] The length of stay was reported to be lower in our study compared to the literature. Although there was no statistical significance between them, the hospitalization duration was tried to be kept shorter during the pandemic period compared to the previous year to reduce the risk of infection.

In a study published in The Lancet, the total 30-day mortality rate was 23%±8%, and it was 25.6% in patients who underwent emergency surgery from the patient subgroups.[27] In our study, no mortality was observed in the early postoperative period.

Conclusion

During the COVID-19 pandemic, AA cases can be safely performed. In this comparative study, no difference was reported between the patient groups in terms of morbidity, except for the surgical technique compared to the pre-pandemic period.

Ethics Committee Approval: This study was approved by the Fatih Sultan Mehmet Training and Research Hospital Ethics Committee (Date: 26.06.2020, Decision No: 17073117-050.06).

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Conflict of Interest: None declared.

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ORİJİNAL ÇALIŞMA - *ÖZ*

COVID-19 pandemi döneminde apendektomi yapılan hastaların pandemi öncesi dönemle karşılaştırılması

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AMAÇ: Pandemi sırasında akut apandisit (AA) tanısıyla hastanemize başvuran hastaların pandemi öncesi döneme göre bekleme ve ameliyat olma sürelerini, AA özelinde sürecin nasıl yönetildiğini ve hastaya ait diğer verileri karşılaştırmaktır.

GEREÇ VE YÖNTEM: Fatih Sultan Mehmet Eğitim ve Araştırma Hastanesi Genel Cerrahi Kliniği'ne AA ön tanısıyla yatışı yapılan hastalar arasında geriye dönük kohort analizi yapıldı. Bu amaçla iki grup oluşturuldu. 1. grup: 11 Mart ve 1 Haziran 2020; 2. grup: 11 Mart ve 1 Haziran 2019 tarihleri arası akut apandisit ön tanısıyla ameliyat edilen hastaların oluşturduğu grup.

BULGULAR: Grup 1'de 46 hasta, grup 2'de 79 hasta akut apandisit ön tanısıyla ameliyat edildi. Gruplar arasında ameliyat öncesi semptom süreleri veya cerrahi bekleme süreleri açısından bir fark bulunamadı.

TARTIŞMA: COVID-19 pandemisi sürecinde AA nedeniyle ameliyat edilen hasta sayılarındaki belirgin azalma, hastaların enfeksiyon kapma endişesiyle hastaneye başvurmaktan duydukları sakınma olarak yorumlanabilir. Komplike olmayan olguların spontan rezolüsyona uğradıklarını da düşündürebilir ancak bu varsayımı desteklemek ve bu durumun kriterlerini bilimsel kanıt düzeyi içerecek şekilde tanımlamak için daha fazla araştırmaya ihtiyaç vardır.

Anahtar sözcükler: Apendektomi; COVID-19 pandemisi; laparoskopi.

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