

Surgeons' Preferences in Treating Acute Uncomplicated Appendicitis during COVID-19 Pandemic: Results of Online Survey among General Surgeons

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ABSTRACT

Objective: The pandemic has affected the entire world. Even though most elective surgeries have been canceled, emergency cases pose a significant concern when the hospital resources are used for patients with COVID. Notably, surgery is the standard treatment for acute appendicitis; however, some studies have analyzed the use of antibiotics in selected cases. Our study aimed to analyze a surgeon's preferences in treating acute appendicitis during the COVID-19 pandemic.

Material and Method: An online survey was conducted for surgeons via the social media platform. 102 surgeons participated in the survey. The survey was designed for consultant general surgeons. The survey queried regarding the surgeons' work hospitals, pandemic status, and treatment strategy before and after the pandemic. Answers to the survey questions were analyzed using descriptive statistics.

Results: 31% of surgeons reported they had changed the treatment strategy for acute appendicitis during the pandemic. 7% of surgeons stated that patients who received antibiotics had to undergo surgery owing to unresponsiveness to the therapy. Two percent of surgeons stated that patients on antibiotherapy developed early complications. Moreover, 29% of surgeons stated that they might change the treatment strategy in selected cases after the COVID-19 pandemic, and only 13% of surgeons may continue to prescribe antibiotics for uncomplicated cases.

Conclusion: Most surgeons did not change the treatment strategy for acute uncomplicated appendicitis during the COVID-19 pandemic. Even though recent guidelines and studies have revealed promising results for antibiotherapy in uncomplicated appendicitis cases, surgery seems to be regarded as the primary treatment strategy.

Keywords: Appendicitis, COVID 19, antibiotherapy, appendectomy

INTRODUCTION

Acute appendicitis is one of the most common causes of acute abdominal pain necessitating emergency surgery. The diagnostic and therapeutic processes related to appendicitis still experience challenges with complications like perforation that still have an incidence as high as 16%–40%, besides the high morbidity and mortality associated with complicated appendicitis (1).

The COVID-19 disease that was declared a pandemic by the World Health Organization has massively burdened the healthcare systems since late 2019. Accordingly, elective surgeries were cancelled, and oncological priorities have been established per the surgical society recommendations. In addition, the COVID-19 pandemic has negatively impacted acute surgical treatments except those for absolute emergencies like trauma (2).

Although appendectomy has been widely accepted as the treatment for uncomplicated appendicitis, antibiotherapy has been used for 60 years, and its use has been analyzed by several randomized trials (3). Nevertheless, the use of antibiotherapy in selected patient groups has been reconsidered during the COVID-19 pandemic, which mandated the optimal use of healthcare resources (4).

Research Article

Received 08-10-2022

Accepted 21-10-2022

Available Online: 22-10-2022

Published 30-10-2022

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Moreover, with the persistent concern of viral spread amidst the restricted health resources, several studies have explored the nonoperative management of nontraumatic surgical emergencies, including acute appendicitis (5).

Therefore, this online survey was conducted to analyze a surgeon's preferences in treating acute uncomplicated appendicitis during the COVID-19 pandemic.

MATERIAL and METHODS

After obtaining approval from the local ethics committee, an online survey was conducted for general surgeons by invitation via a closed social media platform. Overall, 102 surgeons participated in the survey during the 6-month data collection period between March 2020 and September 2020. Informed consent was obtained from the participant during inclusion in the study. The language of the survey was Turkish, and the survey consisted of 16 questions.

The survey queried the surgeons' consultancy year, their hospital's academic attributes, their hospital's pandemic status, and their treatment strategy of uncomplicated acute appendicitis before and during the pandemic. In addition, the reasons for a surgeon's choice of treatment modality were analyzed. Moreover, surgeons' diagnostic orders for excluding the diagnosis of COVID-19 in patients with uncomplicated acute appendicitis, as well as the effect of patient's COVID-19 status on the choice of treatment strategy by surgeons, were questioned.

Furthermore, the survey queried the follow-up criteria for patients who received antibiotherapy. In addition, the survey queried regarding patients who had to undergo surgery after a month of antibiotherapy or those who had complicated appendicitis after this early nonoperative treatment period. Moreover, the survey queried the surgeons' treatment strategy for patients who failed nonoperative treatment. Finally, the survey queried if surgeons would change their treatment strategy after the COVID-19 pandemic.

Statistical Analysis: The study findings were descriptive, and which were statistically analyzed using the "Statistical Package for the Social Sciences", version 20.0 for Windows (SPSS Inc, Chicago, IL, USA) program. Notably, frequency tables, and pie and bar charts were used.

RESULTS

Table 1 presents the participant consultant surgeon's general surgery experience in years, the hospitals' academic attributes, and its COVID-19 pandemic status.

Notably, 47.6% of participating surgeons ordered a thoracic computed tomography (CT) before diagnosis, whereas 31.1% of surgeons ordered other additional diagnostic tests only in patients suspected of COVID-19 [**Table 2**].

Overall, 31.4% of the participating surgeons (n = 32) stated that they changed their treatment strategy of acute uncomplicated appendicitis during the COVID-19 pandemic. Furthermore 54.5% (n = 24) choosing a strategy per the scientific evidence and surgical society's recommendations [**Table 3**].

Moreover, only 40.2 % (n = 41) of the participant surgeons stated that they would not change their treatment strategy in a patient with acute uncomplicated appendicitis with a positive COVID-19 status while the remaining percentage of the surgeons would change their treatment algorithm partially, or totally.

Before the COVID-19 pandemic, 88.6% of surgeons performed surgery (laparoscopic or open) for uncomplicated appendicitis, but during the pandemic, the preference for surgery was low at 60% as the primary modality and at 25.46% based on the characteristics of the cases. The remaining percentage of surgeons considered antibiotherapy [**Table 4**].

Furthermore, when a surgeon's approach in case of complications was queried, 41.66% of surgeons chose the surgical approach (n = 35), 4.76% of surgeons (n = 4) managed with interventional radiological methods plus antibiotherapy, and only 1.19 of surgeons (n = 1) prescribed another antibiotic regimen.

Among the patients treated with antibiotherapy, 19.1% of patients (n = 18) were followed up with clinical examination, laboratory investigation, and abdominal ultrasonography (USG); 18.1% of patients (n = 17) were followed up with clinical examination, laboratory investigation, and CT; 16% of patients (n = 15) were followed up with clinical examination and laboratory investigation; and only 4.3% (n = 4) of patients were followed up with clinical examination. The remaining percentage of surgeons selected other methods.

Notably, 8.9% (n = 8) of patients who were prescribed antibiotics needed to undergo surgery early on during the 1-month follow-up period, per surgeons' survey answers.

Based on the surgeons' survey responses, 59% of patients (n = 49) who were prescribed antibiotics did not have any complications. However, 37.3% (n = 31) of surgeons were unaware if the patient had a complication early during the 1-month follow-up period. Notably, only 3.6% (n = 3) of patients had complications, such as abscess and perforation, early during the 1-month follow-up period [**Table 5**].

Furthermore, 52.2% of surgeons (n = 47) stated they would discontinue their treatment strategy after the COVID-19 pandemic, with 33.3% of surgeons (n = 30) stating that they would alter their treatment strategy to accommodate a case-based approach. In addition, only 14.4% (n = 13) of surgeons stated that they would continue to evolve their treatment strategy after the COVID-19 pandemic.

Table 1: Descriptive data of participant surgeons and hospital properties

Variable	Categories	Number (n)	Percentage (%)
Participant surgeons experience at general surgery (Year)	0-5 Year	16	15,7
	6-10 Year	34	33,3
	11-15 Year	16	15,7
	16-20 Year	16	15,7
	20 and more year	20	19,6
Hospital properties of the participant surgeons	State Hospital	36	35,3
	State affiliated research and education hospital	21	20,6
	Private clinic	2	2,0
	Private hospital	24	23,5
	Private university hospital	4	3,9
	State affiliated university hospital	15	14,7
Hospital's pandemic status	Yes	71	69,6
	No	31	30,4

Table 2: Surgeons diagnostic workups for excluding COVID 19

Diagnostic Tools	Number	Percentage (%)
Ordering Thorax CT	49	47,6
PCR and other laboratory tests	12	11,7
Other investigations	10	9,7
Only for high suspicious cases for COVID 19	31	30,4

Table 3: The rationale behind the changing treatment strategy during COVID-19 pandemic

	Number (n) 70	Percentage (%) 68,6	
The rationale behind the changing treatment strategy during COVID-19 era	Possibility of Transmission of COVID-19 Virus to Patient or Myself	6	5,9
	Other	2	2,0
	Failure of the Patient to Have a COVID-19 Test	1	1,0
	Personal Experience	3	2,9
	Recommendations of surgical associations and scientific literature suggestions	20	19,6

Table 4: Surgeons treatment strategy for acute uncomplicated appendicitis before and during COVID 19 pandemic

Variable	Categories	Number (n)	Percentage (%)
Participant surgeons approach to uncomplicated appendicitis before COVID 19 pandemic	Surgery (Open,laparoscopic)	94	88,6
	Intravenous/oral antibiotherapy with hospitalization	11	10,3
	Intravenous/oral antibiotherapy without hospitalization	1	1,1
Participant surgeons approach to uncomplicated appendicitis during COVID 19 pandemic	Surgery (Open,laparoscopic)	60	52,63
	Intravenous/oral antibiotherapy with hospitalization	18	15,78
	Intravenous/oral antibiotherapy without hospitalization	5	4,38
	Referral to a suitable center	2	1,75
	Surgery or antibiotherapy according to the case properties	29	25,46

Table 5: Surgery needs and complication rates of cases treated with antibiotherapy according the participant surgeons

Surgery needs on early follow-up	Cases underwent surgery	Cases did not underwent surgery
	8,9 % (n :8)	91,1 % (n:82)
Complication rates on early follow-up*	Cases with complication	Cases without complication
	3,6 % (n:3)	59,9 % (n:49)

*37,3 % /n:31) of surgeons did not know as if the antibiotherapy fails

DISCUSSION

The COVID-19 pandemic has brought on a new normal era. The governors and health givers have set aside the limited healthcare resources primarily to treat patients with COVID-19. However, the “stay-at-home” strategy and precautions contained the pandemic’s spread, and emergency hospital visits were reduced by 50%, according to the reports. Nevertheless, some acute-care patients did not visit the emergency care units because of the fear of contracting COVID-19 infection. However, a significant increase in patients with complicated appendicitis was observed compared with previous years. This situation led to additional healthcare costs and burdens when competing with a worldwide pandemic paradoxically (6).

Clinical evaluation of patients adopted new strategies to rule out COVID-19 infection by ordering more CT scans, focusing on the thoracic cavity. This strategy could be to avoid viral exposure in patients and surgeons. Romero et al. revealed that proportionally more appendicitis cases were diagnosed using the CT during the pandemic era than before. Moreover, appendicitis cases might be more complex during the COVID-19 pandemic owing to the patient’s delayed referral (7).

Notably, the surgical institutions have been issued guidelines during the pandemic to prioritize and perform the most critical surgeries that cannot be delayed further. Therefore, when using the limited health resources, which were primarily set aside for patients with COVID-19, several surgical clinics chose to prescribe antibiotherapy as a nonoperative treatment for uncomplicated acute appendicitis. Ganeshe et al. reported that patients with no persistent peritoneal signs on physical examination and finally considered noncomplicated were the primary candidates for antibiotherapy (8). Recent meta-analyses have revealed the feasibility of an antibiotics-first approach in uncomplicated cases. Nevertheless, the most crucial factor is the identification of suitable patients for antibiotherapy who may not develop complications, such as perforation and abscess. Notably, appendicolith has been determined to be an independent risk factor for antibiotherapy failure. (1).

Our study results revealed that 69.6% of participant surgeons worked at hospitals dedicated to COVID-19 with limited surgical resources. Moreover, only 31.4% of surgeons changed their treatment strategy for acute uncomplicated appendicitis during the pandemic. In addition, the pandemic volume status of hospitals might differ in each region of Turkey, and hence, some surgeons would have had to change their treatment algorithm according to the hospital resources. In this online survey, the most proportional group of surgeons (19.6 %) stated that their treatment strategy mainly was based on scientific evidence and surgical society’s recommendations. This finding indicates the significance of rapid dissemination of free scientific knowledge during the COVID-19 era.

Before the COVID-19 pandemic, 88.6% of surgeons performed surgery (laparoscopic or open) for uncomplicated appendicitis but this ratio was low at 60% for surgery as the primary modality and 25.46% based on the characteristics of the cases during the COVID-19 pandemic.

This result is concordant with the percentage of surgeons (31.4%) who stated that they changed their treatment strategy during the COVID-19 pandemic.

Most surgeons (48%) in our survey stated that they ordered COVID-19 tests, including thorax CT, for excluding COVID-19. This result is compatible with the literature findings (7). Moreover, our study revealed that only 40.2% of surgeons did not change their treatment strategy in case of confirmed COVID-19 positivity of patients with appendicitis. This result indicated the importance of COVID-19 pandemic status among surgeons. Notably, the latest Jerusalem guidelines state that selected cases might be appropriate for nonoperative management of uncomplicated acute appendicitis (1). Furthermore, our survey queried the participating surgeons regarding the follow-up strategies for patients who were administered antibiotics. Notably, 43.1% of surgeons did not prescribe any antibiotherapy, whereas the remaining percentage of surgeons followed up patients with some degree of physical examination and radiological tests. Nevertheless, the follow-up methods for patients treated using antibiotherapy might differ based on the surgeon’s practice. Moreover, the literature evidences no consensus regarding the follow-up methods.

Another significant finding of our survey was that surgeons who primarily prescribed antibiotics for uncomplicated appendicitis cases had to operate on only seven patients after antibiotherapy failure early during the 1- month follow-up period. This result is compatible with recent studies (1, 3, 8). In addition, this survey revealed that only three patients had complications after antibiotherapy during the 1- month follow-up period. An earlier case report had indicated that even in patients with comorbidities, conservative treatment would provide successful results (9).

Although no study has analyzed the use of antibiotherapy for appendicitis in patients with COVID-19, antibiotic use in other pathologies have evidenced no additional harm related to the viral disease (2). The rationale for choosing nonoperative treatment modality with antibiotherapy for uncomplicated cases during the COVID-19 pandemic might be to reduce the risk of viral spread in operation room staff and the postoperative mortality of patients with COVID-19, which has been noted to be higher than expected recently (2).

Furthermore, the responses to our last question that interrogated the possibility of evolving the treatment strategy of surgeons for acute uncomplicated appendicitis revealed that only 14.4% of surgeons (n = 13) would continue to evolve their treatment strategy after the COVID-19 period. This result indicates that surgeons still believed that surgery is the mainstay of acute uncomplicated appendicitis treatment. Nevertheless, the pre-COVID-19 era studies and guidelines have analyzed the effectiveness of nonoperative antibiotherapy and determined that it is feasible in selected groups with considerable outcomes (1, 10, 11).

Limitations of the Study: Nonetheless, this online survey study had some limitations. Based on evidence-based medicine, survey studies have an underlying bias stemming from participants’ sentiments and practices. Although this survey was organized for general surgeons through a closed social media hub, the free survey site would allow multiple attempts to answer the survey questions, leading to

misinformation. In addition, some logical issues could arise with inconsistent answers by some participants resulting in irrational proportions.

Although our survey was conducted among a group of surgeons from Turkey, it might not represent the general clinical assessment worldwide because surgeons seem to act according to the local resources and patient characteristics when treating acute uncomplicated appendicitis.

CONCLUSION

Our survey revealed that surgeons still believe that surgery is the primary treatment modality for uncomplicated appendicitis, even during the COVID-19 pandemic. Although the latest guidelines recommend nonoperative management in selected cases, more extensive pragmatic trials are warranted to ascertain the effectiveness and use of antibiotherapy.

Acknowledgments: The authors thank all general surgeons who participated in the online survey study.

Conflict of interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. This research did not receive and specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author Contributions: Concept-ACY, SZ; Supervision-FY, MCA; Materials- ACY, MFE; Data Collection and/or Processing- ACY, SZ, MFE; Analysis and/ or Interpretation- ACY, OA; Writing ACY, SZ. Peer-review: Externally peer-reviewed

Ethical approval: All procedures performed in studies involving human participants were in accordance with the institutional and/or national research committee's ethical standards and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. This research was related to COVID-19 so we firstly were applied to Turkish Ministry of Health Scientific Research Committee and get approval for his COVID research. In this research, ethical approval was obtained from the Kutahya University Local Ethical Committe (Date:04.06.2020, decision no:2020-09-16)

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