Approach to Acute Appendicitis during Covid-19 Outbreak: One Year Experience of a Single Centre

Abstract

Objective: After announcement of Covid-19 pandemic, elective surgeries were postponed and all hospitals were reserved primarily for Covid-19 patients. Aim of this study is to evaluate the change in treatment trends of acute appendicitis during Covid-19 pandemic.

Material and method: For this retrospective study patients diagnosed as acute appendicitis during the pandemic period and one year before the pandemic were evaluated. Diagnostic methods and treatment modalities were compared.

Results: During pandemic period number of cases diagnosed as acute appendicitis did not change with similar rates of complicated cases. During pandemic period 16.1% of the patients had medical treatment. During the one-year period before Covid-19 pandemic rate of patients having medical treatment was found as 7.2%.

Conclusion: During the pandemic period use of medical treatment for acute appendicitis significantly increased.

Keywords: acute appendicitis, surgery, medical treatment, Covid-19

1. Introduction

After announcement of Covid-19 as a pandemic by World Health Organisation (WHO); the priority of health system has turned to Covid-19 patients. Almost all hospital administrations and elective surgeries were postponed, except emergency situations and oncological surgeries. This led to delay in diagnosis of some disorders and increased the number of complicated cases (1).

Acute appendicitis (AA) is the leading cause of emergency abdominal surgery worldwide (2). Besides the increasing popularity of medical treatment; surgery is still the gold standard treatment method for AA. Recent studies showed equivalent results with conservative or medical treatment of AA with appendectomy (3, 4). Studies result that: medical treatment can be a good alternative to appendectomy; especially in uncomplicated AA (5). In the era of Covid-19 pandemic medical treatment can be a good way of decreasing hospital stay and in hospital contamination with Covid-19.

The aim of this study is to evaluate the perspective to medical treatment of AA during Covid-19 pandemic.

2. Material and methods

After approval from Uşak University Ethical Committee for Clinical Trials, this retrospective case control study was conducted at Uşak Training and Research Hospital.

One year (March 2019-march 2020) before the announcement of pandemic by WHO and one year (March 2020-March 2021) after the announcement of pandemic were accepted as the time period. During two years' period patients who were diagnosed as AA by clinical evaluation or imaging modalities were evaluated retrospectively. Patients' data was obtained from hospitals database. Patients were divided into two groups as pre-pandemic period and pandemic period. Patients' demographical data, findings at physical examination, laboratory findings at the hospital administration, imaging modalities and findings used for diagnosis, treatment modalities, surgical findings, hospital stay and 30 days' readmissions were evaluated.

IBM SPSS 22 software was used for statistical analysis. In analysis of qualitative data chi-square test was used. Quantitative data with normal distribution were presented as mean ± standard deviation and in comparison of groups Student T test was used. Level of significance was accepted as 0.05.

3. Findings

There were 921 cases diagnosed as AA during the study period; 475 cases at pre-pandemic group and 446 cases in pandemic group. The mean age of the patients was 28.6±17.18. There were 538 (58.4%) males and 383 (41.6%) females. Groups were similar in terms of gender distribution.

The mean age of patients in pre-pandemic period was 31.3±17.6, while the mean age of patients in pandemic group was 25.8±16.1 (p=0.001).

At the time of hospital administration, the mean WBC count was 13.73±4.7 $x10^3$/ml, the mean CRP level was 46.1±66.14 mg/L. The groups were similar in terms of mean WBC count and CRP level. However, mean CRP level was higher in patients underwent to surgery compared to cases who had medical treatment, 47.7±66.8 vs 33.7±59.8 respectively (p=0.04).

Twenty-two point four percent of patients were diagnosed by physical examination and clinical findings; 29.2% were diagnosed by abdominal ultrasonography (USG); 37% were diagnosed by computed tomography (CT) of abdomen. During the pandemic period USG usage was significantly lower (Table 1).

In pre-pandemic period 92.8% of cases underwent surgery for AA; while in pandemic period 83.9% of cases had surgery. In pandemic period the use of medical treatment has significant increased (p=0.001).

Number of complicated AA remained similar between the groups; 9.5% (n: 42) in pre-pandemic period and 10.1% (n: 38) in pandemic period.

Thirty day readmissions were also evaluated.Hospital readmission rate in pre-pandemic and pandemic periods showed no difference (Table 2). In patients with medical treatment 30-day readmission rate was 44.4%. This rate was significantly lower in patients who had surgery as 8.7% (p=0.001). In readmitted cases after medical treatment; 23.6% had surgery and 20.8% had medical treatment again.

4. Discussion

The current retrospective study evaluated the approach to acute appendicitis at pre-pandemic one year and at the first year of Covid-19 pandemic. The main question was; do the anxiety of the pandemic and fear of in hospital contamination affect surgeons' approach to AA and choice of treatment modality. Our results revealed that choice of medical treatment was increased during the pandemic. Moreover, USG usage which necessitates close contact with the patient was significantly decreased. Thirty-day readmission after treatment for AA showed no difference between pre-pandemic and pandemic.

Some studies showed significant decrease in number of AA cases during pandemic period (6). However, Horst K et al reported no significant decrease in number of AA cases (7). Moreover, they reported significant decrease in usage of imaging modalities. Similarly, our study showed similar case number compared to pre-pandemic period and decreased usage of USG. The main reason of decreased usage of USG is to prevent close contact with cases.

Kamil AM et al evaluated emergency surgical administrations and showed 55% decrease during pandemic (8). They also showed a 44% decrease in administrations with AA. In their cohort; number of complicated cases increased, rate medical treatment increased. Somers K et al compared pre-pandemic pandemic periods in terms of management of AA (9). They reported decreased number of cases and increased use of medical treatment especially in uncomplicated cases. They also reported increased use of CT and high threshold for surgical decision making resulting 0% of negative appendectomy rate during pandemic period. Similarly, our study showed increased rate of medical treatment and similar number of perforated cases.

There are several studies comparing pre-pandemic period with pandemic in terms of management of acute appendicitis. There are conflicting results about the use of medical treatment. According to Mai CVH first line treatment of AA should remain as Surgery (10). However, Colvin et al compared

pre-pandemic and pandemic period and resulted that use of medical treatment increased by 155% (11). They reported a 93% 30 days' success rate with uncomplicated AA and 40% 30-day success rate in complicated cases.

The main limitation of the current study is lacking of long term follow after medical treatment of AA. The main goal of the study is to put forth the situation about the trends in approach to AA and because of the retrospective nature of the study long term follow was not possible. However, most of the studies about the effect of Covid-19 on AA include a 2-3 months' period. Our study compares one year before the outbreak with one year after the outbreak with acceptable number of cases.

Conclusion

During Covid-19 outbreak number of cases with acute appendicitis showed no difference, with similar number of complicated cases. However, most surgeons followed to current trend towards medical treatment.

References

1. Rudnicki Y, Soback H, Mekiten O, Lifshiz G, Avital S. The impact of COVID-19 pandemic lockdown on the incidence and outcome of complicated appendicitis [published online ahead of print, 2021 Jul 26]. *Surg Endosc*. 2021;1-7.
2. Di Saverio S, Podda M, De Simone B, et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. World J Emerg Surg. 2020 Apr 15;15(1):27.
3. Stöß C, Nitsche U, Neumann PA, Kehl V, Wilhelm D, Busse R, Friess H, Nimptsch U. Acute Appendicitis: Trends in Surgical Treatment. Dtsch Arztebl Int. 2021 Apr 9;118(14):244-249.
4. Wang CH, Yang CC, Hsu WT, et al. Optimal initial antibiotic regimen for the treatment of acute appendicitis: a systematic review and network meta-analysis with surgical intervention as the common comparator. J Antimicrob Chemother. 2021 Jun 18;76(7):1666-1675.

5. Emile SH, Hamid HKS, Khan SM, Davis GN. Rate of Application and Outcome of Non-operative Management of Acute Appendicitis in the Setting of COVID-19: Systematic Review and Meta-analysis. J Gastrointest Surg. 2021 Jul;25(7):1905-1915.
6. Percul C, Cruz M, Curiel Meza A, et al. Impact of the COVID-19 pandemic on the pediatric population with acute appendicitis: Experience at a general, tertiary care hospital. Arch Argent Pediatr. 2021 Aug;119(4):224-229.
7. Horst KK, Kolbe AB, McDonald JS, et al. Imaging pediatric acute appendicitis during the coronavirus disease 2019 (COVID-19) pandemic: collateral damage is variable. Pediatr Radiol. 2021 Aug 17:1–9.
8. Kamil AM, Davey MG, Marzouk F, et al. The impact of COVID-19 on emergency surgical presentations in a university teaching hospital. Ir J Med Sci. 2021 Jul 12:1–7.
9. Somers K, Abd Elwahab S, Raza MZ, et al. Impact of the COVID-19 pandemic on management and outcomes in acute appendicitis: Should these new practices be the norm? Surgeon. 2021 Feb 12:S1479-666X(21)00030-5.
10. Mai DVC, Sagar A, Menon NS, Claydon O, Park JY, Down B, Keeler BD. A local experience of non-operative management for an appendicitis cohort during COVID-19. Ann Med Surg (Lond). 2021 Mar;63:102160. doi: 10.1016/j.amsu.2021.02.006. Epub 2021 Feb 12.
11. Colvin D, Lawther S. A *surge* in appendicitis: Management of paediatric appendicitis during the COVID-19 surge in the Royal Belfast Hospital for Sick Children. Ulster Med J. 2021 May;90(2):86-89.

Tables

Table 1. Diagnostic modalities used for diagnosis of acute appendicitis

	Pre-pandemic		Pandemic	
	n	%	n	%

Ultrasonography	159	33.5	110	24.7
Computed Tomography	167	35.2	174	39
Both USG and CT	50	10.5	55	12.3
Clinical findings alone	99	20.8	107	24
Total	475	100	446	100

Table 2. Comparison of 30 days' readmission rates between surgery and medical treatment

30 days readmission	Surgery		Medical treatment	
	n	%	n	%
No readmission	744	91.3	59	55.7
Surgery at readmission	2	0.2	25	23.6
Medical treatment on readmission	69_a	8.5	22	20.8
Total	815	100	106	100