

Original article



Managing Appendicitis during Covid-19 National Lockdown Period: A Single Centre Experience

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ABSTRACT

Introduction: Covid-19 and related nationwide lockdown had a huge impact on the health care resources and services. The delay in the treatment due to lockdown may have effect on the management of surgical emergency like acute appendicitis. This study aims to find out spectrum of presentation and possible complication of acute appendicitis seen during COVID-19 period to emphasize the impact of COVID-19 pandemic to the disease burden.

Methods: A retrospective observational study was conducted at Department of Surgery, KIST Medical College and Teaching Hospital. Data was retrieved from Health Management Information System (HMIS) records after approval from institutional review committee (IRC). Cases of acute appendicitis presenting to the hospital during lockdown from 24th March 2020 to 21st July 2020 (Group 1) were compared with cases presented within similar period of time of previous year; 24th March 2019 to 21st July 2019 (Group 2).

Results: Demographic characteristics and Modified Alvarado Score were similar among both groups. There was a statistically significant difference in duration of presentation to hospital, 3.68 ± 3.04 days in Group 1 versus 2.49 ± 1.56 days in Group 2. Increase in rate of complications (42% versus 19%, $P=0.0222$) was observed during lockdown. More patients were managed conservatively in Group 1. Average duration of admission to hospital was similar.

Conclusion: COVID-19 lockdown caused delay in the presentation of acute appendicitis cases which was associated with more complications.

Keywords : Acute Appendicitis; Covid-19; Complication of Acute Appendicitis

Citation: Dhungel, S, Koirala, K, Koirala, S, Mukhia R. Managing Appendicitis during Covid-19 National Lockdown Period: A Single Centre Experience. JKISTMC 2022; 4(1)8:66-

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Conflict of Interest: None

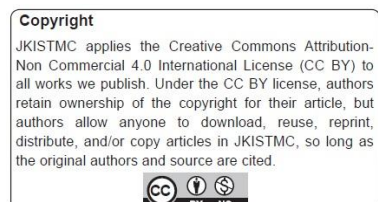
Source of support: None

Article info:

Received : 18 January, 2022.

Accepted : 24 July, 2022

Published : 7 August, 2022.



INTRODUCTION

The novel coronavirus COVID-19 (SARS-CoV-2) was first reported in 31 December 2019 in Wuhan City, China.¹ In Nepal, the first COVID-19 patient was reported on January 23, 2020 and Nepal government announced nationwide lockdown from 24 March 2020.² Covid-19 and nationwide lockdown affected healthcare sector, including treatment of those with conditions like acute appendicitis that require urgent medical care. Stringent lockdown and inaccessible transportation hindered timely presentation to healthcare centres. Acute appendicitis was one of the common surgical emergency attended during Covid19 lockdown and this study aims to find if there were any associated changes in spectrum of presentation and complications due to lockdown effect.

METHODS

The study was a retrospective observational study conducted at Department of Surgery, KIST Medical College and Teaching Hospital, Nepal. Approval was obtained from IRB of KISTMCTH (2077/78/65). Data was acquired from Health Management Information System (HMIS) records of KISTMCTH. Cases of acute appendicitis, diagnosed clinically or via ultrasonography(USG) or Contrast enhanced computed tomography (CECT) presenting to the hospital during lockdown (24th March 2020 to 21st July 2020) were compared with cases during similar period of previous year (24th March 2019 to 21st July 2019). Records were retrieved and relevant data was entered into a separate database. Demographic characters, co-morbidities, presenting features, treatment received (antibiotics based conservative management, open or laparoscopic appendectomy) and complications at presentation or at any point during treatment were recorded. Length of hospital stay was also recorded. All recording of information was done on proforma that was submitted to the IRB for approval.

IBM SPSS Statistics Ver. 27.0.1 was used for analysis. Descriptive variables were calculated as mean with standard deviation (SD), categorical variables between two groups were compared using Chi-squared test and continuous variables were analysed using Student's T test. P value of less than 0.05 was considered significant.

RESULTS

A total of 72 participants were enrolled in the study. 19 participants (Group 1) were from the duration of lockdown (2020-03-24 to 2020-07-21) and 53 were from corresponding period of previous year (2019-03-24 to 2019-07-21) (Group 2). There were 41 males and 31 females (M: F = 1.3). Number of males was more in both groups. Average age in Group 1 was 29.34 ± 15.42 and in Group 2 was 26.68 ± 12.73 . There was a statistically significant difference in days since onset of symptoms to presentation to hospital, 3.68 ± 3.04 days in Group 1 versus 2.49 ± 1.56 days in Group 2 ($P=0.0162$). A modified Alvarado score of 6.00 ± 1.29 in Group 1 and 5.79 ± 1.29 in Group 2 were calculated at presentation. Among the score, Raised leucocyte count (TLC $>11,000/\text{mm}^3$) was seen in 13 patients in Group 1 and 35 in Group 2.

Statistically significant increase in rate of complications was observed during Lockdown. There were 8 complicated appendicitis (42%) like perforation and abscess formation in operative finding during lockdown period compared to 10 in corresponding period of previous year (19%), $P=0.0222$. There was a statistically significant ($P=0.0025$) increase in number of patients managed conservatively during lockdown. 19 patients were managed conservatively in previous year while 14 were managed conservatively during lockdown. 25 patients were operated laparoscopically and 9 underwent open appendectomy in Group 2. There were 2 conversions from Laparoscopic to open appendectomy. In Group 1, 2 were operated

Table comparing acute appendicitis during Covid-19 lockdown period with pre lockdown period of same duration.

	Lockdown (N=19) [Group 1]	Previous year (N=53) [Group 2]	p-value
Age	26.68±12.73	29.34±15.42	0.2518
Sex	M:10; F:9	M:31; F:22	0.3299
No of days of pain	3.68±3.04	2.49±1.56	0.0162
Alvarado score	6.00±1.29	5.79±1.29	0.2748
Fever	7	21	0.4168
Vomiting	14	30	0.0951
Raised TLC	13	35	0.4246
Previous treatment	9	17	0.1170
Complicated	8	10	0.0222
Laparoscopic	2	25	
Open	3	9	
Conservative	14	19	0.0025
Complication during conservative management	28.57%	15.78%	0.1867
Fecalith	2	5	0.4443
Conversion to open	0	2	
Average hospital stay	5.21±2.18	4.75±1.85	0.1910

laparoscopically and 3 underwent open appendectomy. Four out of 14, managed conservatively developed complications during hospital stay in Group 1; and three out of 19 managed conservatively developed complications during hospital stay in Group 2. Presence of fecolith was seen in two in Group 2 and five in Group 1. There were 2 readmissions within 30 days among patients in Group 2 and 1 readmission among patients in Group 1. Average stay in hospital was 4.75±1.85 days in Group 2 and 5.21±2.18 days in Group 1. The increase in length of hospital stay was not statistically significant (0.1910).

DISCUSSION

Covid-19 and lockdown had a great impact on healthcare services. There was obvious delay in the treatment and lack of human resources. Managing surgical emergency like acute appendicitis was also a tricky situation.

Statistically significant ($P=0.0162$) delay in presentation to hospital can be attributed to unavailability of transportation services, closure of health centres, reluctance of health centres towards treatment of patients with unknown COVID-19 status, reluctance of patients towards seeking healthcare services with fear of contagion.

Various studies have shown that delay in seeking/receiving treatment is reflected on an increase in rate of complications.^{4,5} Andersson has claimed that duration of symptoms at operation is dependent mainly on pre-hospital delay.⁵ During lockdown, pre-hospital delays due to multiple factors as discussed above might have

accounted for increased rate in complications. In our study, a complication rate of 42% in patients presenting during lockdown as compared to 19% in previous corresponding period was found ($P=0.0222$). An increase in rate of perforation by 4.5% was also noted. This is consistent with numerous studies. Scheijmans et al., in their multicentre study concluded that proportion of complicated cases increased during lockdown.⁶ Bickell et al., in their retrospective review concluded that after the first 36 hours from the onset of symptoms the average rate of perforation is between 16% and 36%, and the risk of perforation is 5% for every subsequent 12-hour period.⁷ This finding is consistent with our observation of increased rate of perforation with increase in duration of presentation since onset of symptoms.

Not all studies agree with the theory that logistical difficulties or unwillingness of patients to seek treatment are the only reasons for reduction in number of cases presenting to hospital. Delay in seeking/receiving care could have allowed for spontaneous resolution of many cases of appendicitis.⁸

An increase in conservative management of patients were seen during lockdown. 19 patients were managed conservatively (i.e., 36%) in Group 1 while 14 were managed conservatively in Group 2 (i.e., 74%). It was statistically significant ($P=0.0025$). Multiple studies show increase in proportion of conservatively managed patients during COVID-19⁹⁻¹¹. Multiple studies have shown that antibiotics first approach is reasonable and safe for uncomplicated acute appendicitis.¹² Worldwide, overwhelming of health services due to influx of patients with COVID-19 resulted in delayed healthcare or antibiotics based conservative management in patients. In our study, preference of conservative management was largely due to delayed presentation of patients with signs of spontaneous resolution of symptoms and signs. Also, well known complications of delayed presentation, there were cases of appendicular lump or abscess which are preferably managed conservatively.¹²

Symptoms like fever and nausea/vomiting are not known to be associated with duration of illness. While fever and nausea/vomiting are common symptoms with known sensitivity of 27-74% and 40-72% respectively,¹³ their relation with duration of illness have not been elaborated. There is no statistically significant difference in presence of fever and nausea/vomiting between Group 1 and Group 2. While 21 in Group 1 had fever, 7 in Group 2 had fever ($P= 0.4168$). Similarly, 30 in Group 1 had nausea/vomiting and 14 in Group 2 had nausea/vomiting ($P=0.0951$).

Leucocytosis, a sensitive finding in acute appendicitis was seen in 66% in Group 1 and 68% in Group 2. While various studies have shown an increase in WBC count with corresponding increase in rate of complications, no such increase in WBC count was seen in Group 2 despite statistically significant increase in rate of complications ($P=0.4246$) (Guraya et al., 2005), (Al-gaithy, 2012).^{14,15}

There was an increase in proportion of patients receiving some sort of treatment before presentation to hospital during lockdown. While 32% of patients in Group 1 received antibiotics or medications for pain, 47% in Group 2 did so. It is explained, again by difficulty in accessibility of health service or reluctance of patients to seek health service. Instead, most patients took medications from pharmacies or local health centres before deciding to visit our center. We did not take into account the kind of treatment patients received before presenting to our center. Our interest in this was to understand increase in self-treatment pattern as a result of lack of accessibility to health service rather than the actual medications or other forms of treatment received. Literature search yields little information regarding increase in self-medications of diseases other than COVID-19 during the pandemic.

Rate of complications increased among conservatively managed patients during lockdown. While previous years' (Group 1) rate of complications rate among conservatively managed patients of 15.7% is consistent with meta-analysis Zhengyang et al., Group 2 complication rate of 28.5% is higher and not

consistent with most other studies.¹⁶ It could be attributed to pre-existing severity of disease due to delay in presentation. As such, a different approach to patient selection for conservative management might have yielded reduced rate of complications in conservatively managed patients.

5 patients in Group 1 and 2 patients in Group 2 had fecalith. As mentioned in multiple studies, presence of fecalith is an adverse factor and hence conservative management is not advisable in these cases. Patients presenting with fecalith were managed surgically in both groups.

Time duration taken for performing surgery was similar for both groups. 68.53±20.84 minutes was average duration of surgery in Group 1 and 70.00±18.71 minutes was average duration of surgery in Group 2 (P=0.4412). While similar study by Baral et al. have shown an increase in duration of surgery during lockdown owing to preparedness like donning of PPE, no such significant increase in duration was noticed in our centre.¹⁷ Preventive measures like use of PPE were practised adequately in our center, but such preparedness did not result in increase in total duration of surgery.

Average duration of hospital stay was not statistically different between two groups. While average stay in hospital is expected to increase with conservative management due to requirement of prolonged observation, studies show that conservative treatment was associated with a similar or shorter overall length of stay than appendectomy.^{16,18} Shorter length of stay was not seen in our study and but similar length of stay is consistent with other studies.⁹

This study adds useful insights to the limited body of information available regarding the impact of COVID-19 pandemic on health care services delivery. Especially in regards to one of the most common surgical emergencies like acute appendicitis, increase in number of days since onset of symptoms to presentation and increase rate of complicated appendicitis show that COVID-19 and subsequent lockdown caused severe hindrance to people seeking health services. It also highlights how conservative

management might be an acceptable method of management in acute appendicitis, as also shown by multiple studies.^{11,12,19} Our studies show no statistically significant increase in rate of complications among conservatively managed patients, at least in the short term. There was no statistically significant difference in readmission among two groups.

One major limitation of this study is the smaller number of participants, especially in Group 2. While it again reinforces the view that fewer patients had access to health services during lockdown, fewer patients might have biased the findings due to higher variability. Also, since it was a retrospective study, long term follow up of patients was not done, hence long-term outcomes are not known.

CONCLUSION

COVID-19 pandemic and lockdown was a challenge to health service providers. Due to various reasons, COVID-19 lockdown caused delay in the presentation of acute appendicitis cases which was associated with more complications. Our study showed the similar findings and justified the need for early intervention in such cases.

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