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Comparison of Acute Appendicitis Before and Within COVID 19 Era: A Retrospective Study from Rural Nepal

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Abstract

Background Currently, the world has been engulfed with the pandemicity of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and various mitigating measures like lock down and social distancing are being taken which have created significant impact in the emergency surgical health delivery including acute appendicitis (AA). The main aim of this study was to compare the demographic and clinical parameters between two cohorts before the onset of lockdown and within the pandemic.

Methods A retrospective cohort analysis was performed between two groups of patients presenting with AA in one of the tertiary care centers of rural Nepal. The cohorts were named group A and group B who presented three months prior to and after initiation of lockdown on March 24 2020 respectively. These two groups of patients were compared in demographics, clinicopathological characteristics and surgical aspects of acute appendicitis.

Results There were 42 patients in group A and 50 patients in group B. Mean age of the patients was 31.32±171.18 years with male preponderance in group B (N= 29). Mean duration of pain increased significantly in group B [55.4±25.9(B) vs 43.52±30.3(A) hours, P= 0.04] along with mean duration of surgery. [51.06±9.4(B) vs 45.27±11.8(A) minutes, P= 0.015] There was significant decrease in post-operative hospital stay among group B patients. [3.05±1.19(B) vs 4.05±0.8(A) days, P= 0.0001] Complicated cases increased in group B (38% vs 33.3 % including appendicular perforation in 10 cases with perforation rate of 20 %. Six of these 10 cohorts had fecalith present intraoperatively. (P= 0.0001) Similarly, mean duration of presentation to hospital significantly increased in group B patients with perforation. [64.8±22.7(B) vs 52.05±14.7(A) hours]

Conclusion During the adversity of COVID 19, increased number of cases of AA can be dealt with surgery as the chances of late presentation and complexity of the lesion exists.

Background

The whole world has been engulfed by the pandemicity of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which was first seen in Late December in Wuhan, China.[1] The pathogenesis and clinical spectrum of the disease has been widely studied however the trends are changing day to day and new updates are being published. The current scenario has created a havoc throughout the world and most of the countries are trying to outweigh the deleterious effect of the contagion with strategies of social distancing and lock down to mitigate the serious outcome of the virus.[2] During the pandemicity, the spectrum of the surgical emergencies are not supposed to decrease, however one can ascertain that the complexity of the lesion might be drastic owing to late presentation, pursuing home based treatment due to inaccessibility of transportation, fear of contracting the virus in the hospitals and being denied for the treatment.[3]

Acute appendicitis (AA) is one of the most common surgical emergencies worldwide with the life time risk of 7–8%.[4] Gold standard treatment for AA have been surgery for ages however recent trends have

changed and guidelines were published regarding conservative antibiotics based approach for the management of uncomplicated appendicitis. Jerusalem guidelines 2020 recommendation includes discussing Non-Operative Management (NOM) with antibiotics as a safe alternative to surgery in selected patients with uncomplicated AA and absence of appendicolith, advising of the possibility of failure and misdiagnosing complicated appendicitis.[5] It can be assumed that the number of emergency cases might decrease during pandemics along with complicated cases increasing due to late presentation to hospitals which holds true in later case however, former might disagree in settings of low income country. That means we tend to receive more emergency cases than previously experienced which is yet to be proved statistically. Thus, the main aim of this study was to scrutinize the impact of coronavirus disease 2019 (COVID 19) on incidence, demography and patient characteristics in AA comparing with the equal time duration, before and after lockdown was initiated in the country.

Methods

This is a retrospective observational study conducted at Department of Surgery, Lumbini Medical College and Teaching Hospital, Nepal. Ethical approval was taken from Institutional Review Board of Lumbini Medical College. (IRC No: IRC-LMC 21-D/020) All the patients admitted under surgery for the diagnosis of AA, 90 days prior to initiation of lockdown by Nepal government on March 24 2020 and 90 days post lockdown were included in the study. Electronic data base and discharge summaries of the patients from the concerned time duration were retrieved and the required parameters and variables were filled up by the author themselves into the proforma designed. Patients who were treated laparoscopically, open surgery or managed conservatively were the subjects of the study. Complications like appendicular perforation and abscess were also recorded. The subject groups were categorized as Group A, who presented within 90 days prior to lockdown and Group B- within 90 days post initiation of the lockdown. Demography and clinicopathological variables along with intraoperative findings that was encountered were determined. IBM SPSS Statistics ® 16.0 was used for statistical analysis. Descriptive variables were assessed as mean with standard deviation (SD), categorical variables between two groups were compared using Chi-squared test or Fisher’s exact test and continuous variables were tabulated using Student’s T test whichever applicable. Comparison between presence of fecalith and associated perforation along with time duration of pain abdomen were also looked for to find any significant association due to delayed presentation to the hospital. It was assumed that after lockdown initiation, there might be significant changes in clinical parameters and outcomes due to delayed presentation to the hospital. P value of less than 0.05 was considered significant.

Results

Table 1
A comparison between two groups among demography and clinical parameters of patients presenting with AA

Variable	Total (N = 92)	Group A (N = 42)	Group B(N = 50)	P value
Age (Years)	31.32 ± 17.18	30.17 ± 16.12	32.28 ± 18.13	0.56
Sex Male	49	20	29	0.32
Female	43	22	21	
Leukocytosis > 10,000/mm^3	59	20	39	0.002
Duration of pain (Hours)	50 ± 28.5	43.52 ± 30.3	55.4 ± 25.9	0.04
Delayed presentation (> 72 hours)	8	3	5	0.62
Treatment Modality				
Conservative	8	5	3	0.001
Laparoscopic	9	9	0	
Open	75	47	28	
Mean time duration of surgery (minutes)	48.5 ± 10.8	45.27 ± 11.8	51.06 ± 9.4	0.015
Mean Post-Operative Hospital Stay (days)	3.51 ± 1.16	4.05 ± 0.8	3.09 ± 1.19	0.0001
Grade of appendicitis	2 (2.1%)	2(4.7%)	0(0%)	0.28
Normal	57(61.9%)	26(61.9%)	31(62%)	
Uncomplicated	33(35.8%)	14(33.3%)	19(38%)	
Complicated				
Perforation	16	6	10	0.55
Alvarado Score	6.54 ± 1.9	5.74 ± 2.1	7.22 ± 1.4	0.0001
Perforation rate (%)	17.39%	14.2%	20%	
Mortality	0	0	0	

There were total 42 patients in group A and 50 patients in group B. Leukocytosis more than 10000/mm^3 was seen in 20 patients in group A while 39 patients showed increased WBC (White Blood Cells) count in group B which was statistically significant. (P = 0.002) Duration of pain showed statistically significant difference between two groups. (P = 0.04) Time duration of surgery increased in group B in comparison to group A with statistical significance. Hospital stay duration tend to decrease in patients operated after

lockdown was initiated. (4.05 vs 3.09 days, P value = 0.0001) Total patients who presented with perforation were 16 in number which included 10 patients in COVID era and six were before lockdown. Perforation rate increased by 5.8%. Also, patients who presented in last three months period after lockdown were more complicated than those who presented before. There was no mortality. (Table 1)

Table 2
showing the relationship between presence of fecalith and perforation between two groups

		Perforation		P value
	Fecalith	Absent	Present	0.47
Group A(N = 37)	Absent	24	4	
	Present	3	2	
Group B(N = 47)	Absent	36	4	0.0001
	Present	1	6	

Group A (N = 37) patients had six appendicular perforations with two fecaliths. Patients without fecalith were two cases of eight- and 10-year-old boys who presented on three days and seven days of pain abdomen. The third one was 52 years male who was diabetic under medication. Fourth patient had no any comorbidity. Group B (N = 47) patients had 10 perforations which included six fecaliths as the source of perforation. (P = 0.0001) Four cases without fecalith had Diabetes Mellitus 2 (DM-2) in three cases and one was the seven-year-old boy who presented after 72 hours of onset of abdominal pain. (Table 2)

Table 3
showing the association between perforation and mean duration of pain abdomen

Patient characteristic	Perforation	Mean duration of pain abdomen (hours)	P value
Group A	No	41.16 ± 33.16	0.26
	Yes	60 ± 56.28	
Group B	No	52.05 ± 14.7	0.03
	Yes	64.8 ± 22.7	

The mean duration of pain abdomen for perforation cases was 64.8 ± 22.7 hours while it was 52.05 ± 14.7 hours for non-perforated cases that showed significant association between group B patients. (P = 0.03) Similarly, Group A patients showed increased tendency in mean duration of pain abdomen before presentation to hospital however, there was no any statistical significance. (Table 3)

Discussion

The study we conducted at a rural part of the low middle-income country Nepal, came up with various findings especially associated with COVID 19 era comparing the findings with non COVID times. We could find few studies related to appendicitis during this pandemic and most of them arrived into a conclusion of treating lesser number of patients amidst the present scenario.[6, 7] In contrary, we could see a greater number of patients surfacing to the emergencies and getting operated in comparison to the same time frame before this contagious disaster. The valid reason for this disparity could be due to closure of private hospitals around the area from where the patient turns up and the pooling occurred at our institute as this serves as one of the tertiary centers in the region. The duration of pain abdomen before presentation to the hospital significantly increased in between two groups, latter showing 55.4 ± 25.9 hours (P = 0.04). The scenario of delayed presentation to health care centers has been since ages in developing countries due to unaffordability issues, difficult geographical topography and lack of adequate transportation during normal days which itself was compromised. These obligations were further accentuated by the blooming contagion that led to harrowing consequences, which can be anticipated during these times of strict immobility, being confined to homes, maintaining social distancing, taking home based treatments in the fear and anxiety of contracting virus from health care personnel and hospitals.[8] This further aggravates the diseased status of the patient arching to complexity which can be exemplified by the increased rates of perforation and complicated cases in our setting. Appendicular perforation is one of the dreaded complications of late presentation to the hospital which increases morbidity and mortality in comparison to non-complicated appendicitis. Studies have shown the perforation rates ranging from 16% to 40%.[5] Our study showed almost similar rates of perforation though there was slight increase in perforation rates in group B by six percent comparing to group A patients (14.2% vs 20%) while total complicated cases increased by around 5% (33.3% vs 38%). Snapiri et al.[9] showed total complicated rates of 22% during COVID times which was similar to study by Tankel et al.[6] however our data shows almost doubled rate of complicated cases. Overall prevalence of fecalith was 14.2% in our study in which 33.3% of perforations in group A and 60% of perforations in group B were fecalith induced. The prevalence rate was similar to study from West Indies by Ramdass et al.[10] where fecaliths were present in 13.6% of the appendectomy specimens.

The mean operative time duration increased significantly between two groups, the latter one showing mean duration slightly more in comparison. This could be due to extra precautions taken by the operating surgeons, virtually limiting chances of prick injuries, trying the best to limit complications to occur and operating while wearing Personal Protective Equipment (PPE) with a foggy visibility along with complicated appendicitis encountered mandated extra cautiousness to take into account. Tankel et al.[6] in his publication accounted the mean duration of surgery for 47.2 ± 28.9 minutes which almost corroborates our timing of 51.0 ± 9.4 minutes. Around two to six percent of cases with AA present with appendiceal mass which mainly includes inflammatory phlegmon or abscess.[11] Overall rate of appendicular lump was 7.6% in our study. Only three cases were managed conservatively in group B which included appendicular lump in two cases. Duration of hospital stay tend to decrease in group B patients in our study with statistical significance in comparison to group A which could be due to patients willing to get discharged early once operated if feasible, minimizing the risk of protraction of the virus

from other patients who have been hospitalized. Also, this practice allowed the rapid turnover of the patients allowing void of the beds that may be required in times of crises if surge of the COVID cases were to be seen in the forthcoming days.

Our study depicted that the surgical approach that was mandated at our institute for long before the pandemic ensued, is still being followed and the treatment strategy for the cases of AA was solely based upon the clinical judgement of the surgeon whether to operate or not, maximizing the use of protective gears with minimum use of man powers in operating room. The principle of treating the primary cause rather than the symptoms of the disease was not violated keeping in mind the burden of the present contagion scenario which seems quiet less in developing countries like Nepal in comparison to the other parts of the world. Similarly, there might be some obligations for proceeding with conservative approaches with antibiotics alone in the setting of a low-income country where radiological investigations like CECT might not be feasible or available in order to diagnose non complicated appendicitis and rule out complicated cases. What our experience suggests is the cost factor if tabulated while performing CT abdomen along with fetching antibiotics almost completes the surgery. The financial aspects also need to be considered while working on low resource settings like ours where the needy ones are striving for surgical health and financial burden needs to be mitigated providing the definite care in a low budget scenario.

There are several limitations of the study. This is a single center analysis of the patients with a smaller sample size which might not cover all the demographic and clinical aspects of the cohorts. As the current pandemic is yet unknown till when it shall perish, corona virus has been seen to involve almost many of the bodily systems. The novice nature of this contagion which seems to involve gastrointestinal system might even affect the clinical course of appendicitis which is yet to be elucidated, in which case the number of samples might increase along the parameters. None of the patients had testing for coronavirus as the tests were limited, costly and reserved for symptomatic or suspected cases. Still, we are experiencing positive cases without symptoms while tracing contacts, there would have been cohorts with positivity of the virus without symptoms if tests were implemented which would have changed the treatment modality for suspected uncomplicated cases.

Conclusion

During the adversity of COVID 19, number of cases of AA, duration of presentation to hospital and complicated cases along with perforation rate tend to increase in comparison to the cohort before the pandemic. Surgery should be the mainstay of treatment as the conservative approach in fear of the pandemics might not be cost effective in areas of low-income countries.

Abbreviations

SARS-CoV-2: severe acute respiratory syndrome coronavirus 2

AA: Acute appendicitis

NOM: Non-Operative Management (NOM)

COVID 19: Coronavirus disease 2019

WBC: White Blood Cells

DM-2: Diabetes Mellitus 2

PPE: Personal Protective Equipment

Declarations

Availability of the data and materials:

The corresponding author is responsible for the data described in the manuscript and assure full availability of the study material which can be made available upon request from corresponding author/ Institutional Review Board of Lumbini Medical College.

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Contribution

SB designed the study, collected data, performed the statistical analysis, and drafted the manuscript. RKC critically reviewed and supervised the manuscript. NT critically reviewed and supervised the manuscript. All authors read and finalized the manuscript.

Ethics Declaration

Ethical approval and consent to participate

The ethical approval was approved by Institutional Review Board of Lumbini Medical College and Teaching Hospital. Approval number is - IRC-LMC 21-D/020. Consent to participate is not applicable given the retrospective nature of the study.

Consent for publication

Not Applicable

Competing Interests

The authors declare to have no competing interest to disclose in relation to the present study.

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