

**Retrospective Clinical Study of Acute Appendicitis in COVID-19 Pandemic:
A Study of 100 Cases**Abinasha Mohapatra¹, Sunil Sahu², Himansu Shekhar Mishra³¹Assistant Professor, Department of General Surgery, Veer Surendra Sai Institute of Medical Science And Research(VIMSAR), Burla, Sambalpur, Odisha, India, 768017²Assistant Professor, Department of General Surgery, Veer Surendra Sai Institute of Medical Science And Research(VIMSAR), Burla, Sambalpur, Odisha, India, 768017³Assistant Professor, Department of General Surgery, Shri Jagannath Medical College and Hospital, Puri, Odisha, India, 752002

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Abstract:**Background:** Acute appendicitis is having around 7% probability of occurrence over one's lifetime. Acute appendicitis is a common gastro-intestinal disease affecting 5.7–57 per 1lakh individual each year with the highest incidence in children and adolescents. Acute appendicitis is the most common reason for emergency abdominal surgery and must be distinguished from other causes of abdominal pain.**Aim and Objective:** To compare the clinical presentation, grade of presentation and post-operative complication of acute appendicitis before (July 2019- February 2020) and during (March 2020 – October 2020) the COVID-19 pandemic.**Method:** Based on clinical and radiological features, cases divided into 2-groups [pre-pandemic group (group-1) i.e. having 65 cases, and pandemic group (group-2) i.e. having 35 cases] and 5- grades [Grade-1 (Probable appendicitis), Grade-2 (Appendicitis), Grade-3 (Appendicular perforation), Grade-4 (Appendicular abscess), Grade-5 (Complicated appendicitis / appendicular mass).**Results:** Out of 100 cases enrolled, 65 and 35 cases belong to pre-pandemic period and pandemic period respectively. Higher grades, post-operative complications were more common in pandemic period.**Conclusion:** This pandemic period affects diagnosis, treatment protocol, and increases post-operative complications, which may be due to delayed presentation in casualty department resulting delayed diagnosis and advanced stage of the disease.**Keywords:** Pandemic period, Pre-pandemic period, Acute appendicitis.

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Introduction

Wuhan (in China), from where Coronavirus disease (COVID-19) started in December 2019 leading to severe acute respiratory syndrome, became epidemic. Later on it was declared as pandemic by WHO (World Health Organisation) on 11th March 2020 [1]. Due to implementation of the lockdown phase in national level, both emergency and elective care has been reduced to only those come with acute emergency resulting delayed presentation advanced stage of the disease. Out of these, acute appendicitis is having around 7% probability of occurrence over one's lifetime [2]. Acute appendicitis is a common gastro-intestinal disease affecting 5.7–57 per 1lakh individual each year with the highest incidence in children and adolescents. Acute appendicitis is the most common reason for emergency abdominal surgery and must be distinguished from other causes of abdominal pain. When the diagnosis is delayed, it may be complicated by perforation and

inflammatory mass in 2-10% of cases [3]. However overall diagnostic accuracy achieved by traditional history, physical examination and laboratory tests has been approximately 80%. Imaging. CT Scan and other imaging modalities have been used when diagnosis is unclear. i.e. in other words approximately 45% do not display classic signs of acute appendicitis, making imaging a potential useful tool i.e. approximately 1/3rd of patients have normal WBC counts and some are afebrile until perforation [4].

In such situation CT and other imaging modalities can aid the diagnosis. Ultrasonography is safe and readily available with the accuracy rate between 71-97%, although it is highly operator dependent and difficult in patient with a large body habitus. While there is controversy regarding the use of USG, CT Scan technique is best with accuracy rate between 93-98%.

Aim and Objective

To compare the clinical presentation, grade of presentation and post-operative complication of acute appendicitis before (July 2019- February 2020) and during (March 2020 – October 2020) the COVID-19 pandemic.

Method and Material

Study Type: Retrospective study

Source of Data: Patients admitted in department of General Surgery, Veer Surendra Sai Institute of Medical Science and Research (VIMSAR), Burla, Sambalpur, Odisha, India with clinical diagnosis of acute appendicitis were reviewed during our study period.

Study Period

- From July 2019 to February 2020 (Before COVID-19 pandemic)
- From March 2020 to October 2020 (During COVID-19 pandemic)

Calculated Sample Size (N)

100 (65 and 35 cases, pre-pandemic and during the Pandemic respectively)

Inclusion criteria

- Patients between 15 to 75 years of age irrespective of sex with clinical diagnosis of acute appendicitis, and who were undergone appendectomy.

Exclusion criteria

- Age below 15 years and more than 75 years.
- Immuno-compromised patients
- Patients with other diseases

Method of collection of data

Details of cases were recorded including history and clinical examination. Age, gender, and clinical characteristics (presence of abdominal pain, fever, guarding in right iliac fossa, elevation of C-reactive protein levels, leucocyte counts with all routine investigations), intra-operative procedure, post-operative hospital stay, and complications of patients were noted. Complications encountered at and after surgery were evaluated.

Study design

Based on clinical and radiological features, cases divided into

= 2-groups as follows

- A. pre-pandemic group (group-1) i.e. having 65 cases
 - B. pandemic group (group-2) i.e. having 35 cases
- = 5- grades as follows
- A. Grade-1 (Probable appendicitis)
 - B. Grade-2 (Appendicitis)
 - C. Grade-3 (Appendicular perforation)
 - D. Grade-4 (Appendicular abscess)
 - E. Grade-5 (Complicated appendicitis / appendicular mass)

Statistical Analysis

Two patient groups were compared using Chi-square test and student's t test. P-value of < 0.05 indicated a statistically significant difference for all comparisons.

Results

Out of 100 cases enrolled, 65 and 35 cases belong to pre-pandemic period and pandemic period respectively with age ranges between 15-75 years.

Table 1: Demographic status

Factor	Pre-pandemic period (n=65)	Pandemic period (n=35)	p-value
Mean age, (SD)	37.5 (18.43)	36.7 (17.78)	< 0.05
Gender- Men, Women	52(80%)	26(74%)	< 0.05
	13 (20%)	9 (26%)	

Table 1: The mean age in group-1 and group-2 were 37.5 years and 36.5 years, with SD=18.43 and 17.78 respectively. Male to female ratio in group-1 and group-2 were 80:20 and 74:26. Overall males were predominantly affected with ratio 78: 22 in this study, which is statistically significant.

Table 2: Comparison of grades of appendicitis in pre-pandemic and pandemic period

Period	Grade-1	Grade-2	Grade-3	Grade-4	Grade-5	p-value
Pre-pandemic period (n=65)	7 (10.8%)	43 (66.3%)	5(7.8%)	2(3.2%)	8(11.9%)	< 0.05
Pandemic period (n=35)	1 (2.89%)	7 (20%)	15 (42.9%)	10 (28.5%)	2 (5.8%)	

Table 2: Grade 2 (66.3%) and grade 3 (42.9%) having highest incidence in pre-pandemic and pandemic period respectively. Overall grade 1 and 2 in pre-pandemic period have more than 50% incidence, and grade3 and 4 in pandemic period have more than 50% incidence. That states higher grades were more common at presentation in pandemic period which is statistically significant (p-value < 0.05).

Table 3: Post-operative complications during pre-pandemic and pandemic period

	Wound infection	Mean hospital stays	Mortality
Pre-pandemic period (n=65)	4 (6.3%)	6.3 days	0(0%)
Pandemic period (n=35)	16 (46%)	9 days	(2%)
p-value	0.002	0.0123	
Chi-square value	50.3212	7.8532	

Table 3: Post-operative complications were more common during pandemic period. Incidence of wound infection (46%) and mean hospital stay (9 days) were higher in pandemic group with p-value < 0.05, which is statistically significant.

Discussion

On comparing pre-pandemic period, pandemic period affects younger age group in both sexes, mean age in years 37.5 vs 36.7 (Table-1). In our study the number of cases with acute appendicitis are lower (65 cases vs 35 cases) in pandemic period, which is similar to Javier et al study in Columbia (141 cases vs 55 cases) [5].

Higher grades like appendicular perforation and appendicular abscess (constitutes 71.4%), were more common in pandemic period comparison to pre-pandemic period where lower grades (like probable appendicitis, appendicitis) were predominant (p-value < 0.05), which is similar to the study by H. Javanmard-Emamghissi et al and Javier Romario et al. (Table-2)

This pandemic period affects diagnosis, treatment protocol, and increases post-operative complications, which may be due to delayed presentation in casualty department resulting delayed diagnosis and advanced stage of the disease (Table-3). As a result of delayed presentation and no use of laparoscopic surgeries due to restriction imposed by the corona infection, post-operative hospital stay and wound infection rate were also high [6].

Many factors were responsible for delayed presentation on hospital during pandemic period. In study by Ori Snapiri et al concluded the fear of contracting with COVID-19 in public places such as hospital or casualty, inadequate clinical examination in hospital set up and with more of telemedicine concepts resulting in misdiagnosis are quoted as primary reasons [7]. Another study by Lazzarini M et al in Italy postulated it reflects the scarcity of the resources available as a result of pandemic based resolutions and fear grip of the people to get exposed to corona infections in the hospital[8].

Conclusion

This pandemic period affects diagnosis, treatment protocol, and increases post-operative complications, which may be due to delayed presentation in casualty department resulting delayed diagnosis and advanced stage of the disease.

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