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Panacea Journal of Medical Sciences

Journal homepage: http://www.pjms.in/

Original Research Article

Retrospective analysis of acute appendicitis in COVID-19 pandemic – A clinical study of 100 cases

Harekrishna Majhi[1], Debashisha Roy[2]*, Manas Ranjan Mallick[3]

[1]*Dept. of General Surgery, SCB Medical College and Hospital, Cuttack, Cuttack, India*
[2]*Dept. of General Surgery, Pandit Raghunath Murmu Medical College and Hospital (PRM MCH),, Baripada, Mayurbhanj, Odisha, India*
[3]*Dept. of Pediatrics, Pandit Raghunath Murmu Medical College and Hospital (PRM MCH), Baripada, Mayurbhanj, Odisha, India*

ARTICLE INFO

Article history:
Received 17-05-2022
Accepted 25-07-2022
Available online 13-03-2024

Keywords:
Pandemic period
Pre-pandemic period
Acute appendicitis
COVID-19

ABSTRACT

Background: Acute appendicitis is a very common abdominal emergency condition. The incidence varies from 5.7 to57 patient /lakh population per year in the world wide survey. It is frequent in both sexes, But highest in children & adolescences. Presentation of this condition is some time so confusing that it should be distinguished from other acute abdominal conditions in proper time and appropriate measures should be taken to treat the patients to avoid unwanted complications, this complication is probably more complicated in COVID-19 pandemic period.
Objective: This study is designed to compare acute appendicitis cases in relation to clinical features, gradation of disease & post operative complications before COVID-19 (June 2019-March 2020) and during COVID-19 pandemic period (April 2020-October 2021). METHOD-Cases of the study were divided into 2-groups.Group-A (65 cases) in pre- pandemic period and Group-B (35 cases) in pandemic period. The study is based on the clinico-radiological features, laboratories investigations and gradation of disease. Gradation: Grade-I (probably appendicitis), Grade-II (definite appendicitis), Grade-III (perforation of appendices), Grade-IV (appendicular abscess), Grade-V (complicated appendicitis/ appendicular lump).
Result: Out of 100 enrolled cases 65 belongs to pre pandemic and 35 in pandemic period. It was found that increase in post-operative complications, were more in higher grade groups during pandemic periods.
Conclusion: The COVID-19 pandemic has great impact on diagnosis, treatment and increased complications in post operative period of acute appendicitis, probably due to late presentation in emergency department. Pandemic directly or indirectly affect the outcome of a disease process and management.

1. Introduction

COVID-19 that created a havoc over a period of a year as a serious respiratory tract disease, was first discovered in Wuhan of China. This deadly disease was said to be started in December 2019. The COVID-19 was later on declared as pandemic by WHO on dated 11.03.2020.[1] And this disease became the death hunt for million and million human beings. To over come the situation WHO proposed that Isolation is the only way to slow down the rapid spread of the disease. For that Lockdown, Shutdown measures were taken aiming to minimize the public movement, which may effectively control the spread in national level.[2] But this steps also some adverse impact on the dealing with Emergency surgical patients, and Acute Appendicitis being the one of the such emergency related disease.This emergency surgical interventions in acute appendicitis

* *Corresponding author*.
E-mail address: dr.deb.roy0506@gmail.com (D. Roy).

https://doi.org/10.18231/j.pjms.2024.026

are due to different causes like appendicolith,tumors and hyperplasia of lymphoid follicles.[3,4] It is also observed in most of the countries that, during this COVID-19 pandemic period there is a decrease in incidence of appendicitis patients aswell as increase in incidence of complicated appendicitis cases.[5–7]

Not only emergency cases, elective operations were also deferred due to this pandemic. Only selective emergency cases of acute appendicitis who came to emergency were entertained with much difficulties. These cases were dealt with, taking utmost precautionary measures. The case of acute appendicitis are one of the very common GI diseases and every individuals has 7% chances of suffering from this disease in there lifetime.[8] The incidence varies from 5.7 to 57/1Lakh population and the sufferer are highest belongs to children and adolescent age group. Male to female ratio shows male predominance i.e 4:1. Taking the severity of the condition into consideration, immediate diagnosis by history & clinical examination, laboratories tests, Grading of disease, appropriate imaging technique (USG of abdomen - pelvis accuracy rate 71 to 97% & CT scan of abdomen-pelvis with accuracy rate 93 to 98%),[9,10] appropriate treatment measures will give definite approachable outcome.[11] But delay in diagnosis in the form of delayed appearance in out patient department (OPD), delay in attending the patient due to some institutional protocols & guidelines used, deviation in classical presentation or due to complications of the disease and co morbidity, the final outcome may slip away from surgeons hand. Delay may lead to either mass formation (Good sign) or may end in perforation of inflamed appendix with spillage of content into the peritoneal cavity (Grave sign).[12] Some time it may be difficult to distinguish the condition from other intra abdominal catastrophe that make the treatment delay.

2. Aim and Objective

To find out the difference in clinical features, gradation and postoperative complications of acute appendicitis in pre pandemic (June 2019-March 2020) and pandemic period (April 2020-October 2021) of COVID-19.

3. Material and Methods

The cases were selected from the Indoor admitted patients in General Surgery department PRM medical college& hospital, Baripada, Odisha, India, those who are diagnosed as acute appendicitis, were recorded.

3.1. Study period

From June 2019-March 2020 (Before COVID-19 pandemic).

From April 2020 to October 2021 (During COVID-19 pandemic).

Sample size (n) – 100 (65 and 35 cases, pre-pandemic and during.

Pandemic respectively).

3.2. Inclusion criteria

The acute appendicitis diagnosed cases were selected between the age group of 15-75 years, without any sex discrimination, who had under gone appendicectomy.

3.3. Exclusion criteria

1. Patients below the age of 15 and above 75years.
2. Known or diagnosed immune compromised cases.
3. Patients with any other associated comorbiditis.

3.4. Method of collection of data

The data of the cases were taken from the case record of the patient as follows:

Age, sex, clinical history & examination (pain abdomen, fever, vomiting, anorexia, constipation/diarrhea, tender right iliac fossa, right iliac fossa lump, rebound tenderness) , findings of elevated C-reactive protein, complete blood count, other specific blood investigations, urine routine & microscopy and imaging modalities like plain X-ray abdomen in erect view, ultrasonography & CT scan of abdomen –pelvis along with operational findings, operation procedures done, post operative hospital stay and post operative complications encountered were recorded.

3.5. Study design

Total cases were categorized into 2(Two) groups for comparison of Pre pandemic group & Pandemic group.

1. Pre-pandemic group(group-A) i.e. having 65 cases.
2. Pandemic group (group-B) i.e. having 35 cases.

On the basis of clinical and radiological findings, cases were divided into 5-grades as follows:[13]

1. Grade-I (Probable appendicitis).
2. Grade-II (Definite appendicitis).
3. Grade-III (Perforation of appendics).
4. Grade-IV (Appendicular abscess).
5. Grade-V (Appendicular lump/ Complicated appendicitis).

3.6. Statistical analysis

Two patients 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.

3.7. Ethical approval

Taken from Institutional Ethics Committee (IEC) of Pandit Raghunath Murmu Medical College And Hospital (PRM MCH), Baripada, Mayurbhanj, Odisha, India, with Ref No. 29/ 6^{th} IEC meeting, before starting the study.

4. Results

Total 100 cases were enrolled, out of that 65 cases were belongs to Pre-pandemic period and 35 cases belongs to Pandemic period, with age range between 15-75 years.

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

Table 2 grade II (66.3%) and grade III (42.9%) having highest incidence in pre-pandemic and pandemic period respectively. Overall grade I and II in pre-pandemic period have more than 50% incidence, and grade III and IV in pandemic period have more than 50% incidence. That indicates higher grades were more common in presentation during pandemic period which is statistically significant (p-value < 0.05).

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

5. Discussion

This study shows the occurrence of disease in young & adult age group are the main sufferer in both pre pandemic & pandemic period. The mean age being the 37.5yrs in Group-A and 36.7yrs in Group-B with SD=18.43 & 17.78 respectively in pre & pandemic period, which tally with the study result of Javier et al study in Columbia (141 cases v/s 55 cases).[14]

The male: female ratio shows male predominance in both period and it is 80:20 & 74:26 respectively in pre pandemic & pandemic period. The average of male predominance is 78:22 in this study, which is similar to the study result of Javier et al study in Columbia.[14]

The gradation of disease also shows higher result in pandemic period than the pre pandemic period. The grade like appendicular perforation(grade-III),appendicular abscess (grade-IV) are more in pandemic period in compare to pre pandemic period, which is more than 50%.This study is similar to the result of H.Javanmard-Emamghissi et al and Javier Romario et al. (Table-2)

The mean length of hospital stay in our study is more in pandemic period group of patients, in comparison to pre pandemic groups, which tally with study of Bickel et al.[15]

In compare to pre pandemic period, the complication rate in pandemic period is more. This may be due to the lock down, shut down and restriction in treatment protocol, which directly or indirectly affect the late presentation in casualty, diagnosis, treatment and post operative complications. Also due to late presentation in emergency department and restriction caused by corona virus infection spread in laparoscopic surgeries under general anesthesia leading to high rate of wound infection & post operative complications.[16]

In pandemic period it also shows that there was delay in presentation at casualty department due to many factors like fear for transmission of COVID-19 in hospital & public places, restriction of treatment protocol in hospital, more uses of treatment by virtual mode like telephonic advise to patient, so also implementation of telemedicine treatment concept increases the chances of misdiagnosis of disease. This study similar to the study of Ori Snapiri et al.[17] There were also significant decrease of uncomplicated appendicitis cases and significant increase of complicated cases during this pandemic period indicating deprivement from getting in time surgical care by patients.[7] Also the characterstics of patients with inflamed appendices were worsened due to delay in time of emergency surgery owing to awaiting for COVID-19 test reports preoperatively[18].

Different studies had shown reduced admission of acute appendicitis cases during pandemic period because of more preference towards conservative treatment by antibiotics at home for mild symptoms, which correlates to our study finding of patient groups between pre pandemic and pandemic group is 65 and 35 respectively.[19–23]

Also study shown by Lazzerini M et al in Italy postulated, it indicates scarcity of the available resources owing to pandemic based resolutions and fear of general population of getting exposed to corona virus infection in health centers.[24]

6. Conclusion

This pandemic period of COVID-19 has some adverse impact on diagnosis of cases, treatment modalities and on post operative complications. Probably the post operative complication may be related to late presentation in outpatient department and subsequent delay in diagnosis & delay in appropriate treatment in time. The disease pandemic directly or indirectly affect the outcome of a

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%) 13(20%)	26(74%) 9(26%)	> 0.05

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

Period	Grade-I	Grade-II	Grade-III	Grade-IV	Grade-V	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 3: Comparison ofPost-operative complications between pre-pandemic and pandemic period.

	Wound infection	Mean hospital stay	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	

disease process and management.

7. Source of Funding

None.

8. Conflict of Interest

None.

References

1. Andersenk G. The proximal origin of SARS-CoV -2. *Nature Medicine*. 2020;26:450–452.
2. Romero J, Valencia S, Guerrero A. Acute appendicitis during coronavirus disease 2019 (COVID-19): changes in clinical presentation and CT findings. *J Am Coll Radiol*. 2020;17(8):1011–3.
3. Swischuk LE, Chung DH, Hawkins HK, Jadhav SP, Radhakrishnan R. Non-fecalith-induced appendicitis: etiology, imaging, and pathology. *Emerg Radiol*. 2015;22(6):643–9.
4. Teixeira FJR, Netto SC, Akaishi EH, Utiyama M, Menegozzo CAM, Rocha MC, et al. Acuteappendicitis, inflammatory appendiceal mass and the risk of a hidden malignant tumor: a systematicreview of the literature. *World J Emerg Surg*. 2017;12:12–12. doi:10.1186/s13017-017-0122-9.
5. Tankel J, Keinan A, Blich O, Koussa M, Helou B, Shay S, et al. The decreasing incidence of acute appendicitis during COVID-19: a retrospective multi-centre study. *World J Surg*. 2020;44(8):2458–63.
6. Lee-Archer P, Blackall S, Campbell H, Boyd D, Patel B, Mcbride C, et al. Increased incidence of complicatedappendicitis during the COVID-19 pandemic. *J Paediatr Child Health*. 2020;56(8):1313–4.
7. Orthopoulos G, Santone E, Izzo F, Tirabassi M, Perez-Caraballo M, Corriveau N, et al. Increasing incidence of complicated appendicitis during COVID-19 pandemic. *Am J Surg*. 2020;221(5):1056–60.
8. Addoss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. *Am J Epidemiol*. 1990;132(5):910–25.
9. Vons C, Barry C, Maitre S, Pautrat K, Leconte M, Costaglioli B, et al. Amoxicillin plus clavulanic acid versus appendicectomy for treatment of acute uncomplicated appendicitis: an open-label, non-inferiority, randomised controlled trial. *Lancet*. 2011;377(9777):1573–9.
10. Rao PM, Rhea JT, Novelline RA. Sensitivity and specificity of the individual CT signs of appendicitis: experience with 200 helical appendiceal CT examinations. *J Comput Assist Tomogr*. 1997;21(5):686–92.
11. Nitecki S, Assalia A, Schein M. Contemporary management of the appendiceal mass. *Br J Sur*. 1993;80(1):18–20.
12. Liu CD, Mcfadden DW. Acute abdomen and appendix. In: Greenfield L, Mulholland M, Oldham K, editors. Surgery: Scientific Principles and Practice. 2nd edition. vol. 2. Philadelphia: Lippincott, Williams & Wilkins; 1997. p. 1246–61.
13. Garst GC, Moore EE, Banerjee MN, Leopold DK, Burlew CC, Bensard DD, et al. Acute appendicitis: a disease severity score for the acute care surgeon. *J Trauma Acute Care Surg*. 2013;74(1):32–6.
14. Romero J, Valencia S, Guerrero A. Acute Appendicitis During Coronavirus Disease 2019 (COVID-19): Changes in Clinical Presentation and CT Findings. *J Am Coll Radiol*. 2020;8:1011–3. doi:10.1016/j.jacr.2020.06.002.
15. Bickel A, Ganam S, Shakra I, Farkash I, Francis R, Karra N, et al. Delayed diagnosis and subsequently increased severity of acute appendicitis (compatible with clinical-pathologic grounds) during the COVID-19 pandemic: an observational case-control study. *BMC Gastroenterol*. 2022;22(1):19. doi:10.1186/s12876-021-02024-9.
16. Disaverio S, Podda M, Desimone B, Ceresoli M, Augustin G, Gori A, et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. *World J Emerg Surg*. 2020;15(1):27. doi:10.1186/s13017-020-00306-3.
17. Snapiri O, Danziger CR, Krause I, Kravarusic D, Yulevich A, Balla U, et al. Delayed diagnosis of paediatric appendicitis during the COVID-19 pandemic. *Acta Paediatr*. 2020;109(8):1672–6.
18. Kim CW, Lee SH. Impact of COVID-19 on the care of acute appendicitis: a single-center experience in Korea. *Ann Surg Treat Res*. 2021;101(4):240–6.
19. Basamh M, Rajendiran A, Chung WY, Runau F, Sangal S. Management of appendicitis during the COVID pandemic: Lessons from the first month of the outbreak. *Br J Surg*. 2020;107(11):450–1.
20. Podda M, Pata F, Pellino G, Ielpo B, Saverio SD. Acute appendicitis during the COVID-19 lockdown: never waste a crisis. *Br J Surg*. 2021;108(1):31–2.
21. Ganesh R, Lucocq J, Ekpete O, Ain NU, Lim SK. Management of appendicitis during COVID-19 pandemic: short-term outcomes. *Scottish Med J*. 2020;65(4):144–8.
22. Tankel J, Keinan A, Blich O, Koussa M, Helou B. The decreasing incidence of acute appendicitis during COVID-19: a retrospective multicentre study. *World J Surg*. 2020;44(8):2458–63.
23. Collard M, Lakkis Z, Loriau J, Mege D, Sabbagh C. Antibiotics alone as an alternative to appendectomy for uncomplicated acute appendicitis in adults: changes in treatment modalities related to the

Covid-19 health crisis. *J Visc Surg*. 2020;157(3):S33–42.
24. Lazzerini M, Barbi E, Apicella A, Marchetti F, Cardinale F, Trobia G, et al. Delayed access or provision of care in Italy resulting from fear of COVID-19. *Lancet Child Adolesc Health*. 2020;4(5):e10–1.

Author biography

Harekrishna Majhi, Professor

Debashisha Roy, Assistant Professor

Manas Ranjan Mallick, Assistant Professor

Cite this article: Majhi H, Roy D, Mallick MR. Retrospective analysis of acute appendicitis in COVID-19 pandemic – A clinical study of 100 cases. *Panacea J Med Sci* 2024;14(1):139-143.