



Emergency Gastrointestinal Surgery and In-hospital Mortality during COVID-19 Pandemic: Single Centre Study on Confirmed COVID-19 Patients

**Ricky Dwi Nur Tyastono^{1*}, Riza Setya Agrensa¹
and Ida Bagus Budhi Surya Adnyana²**

¹*Department in Medical Faculty of University Sebelas Maret, Indonesia.*

²*Digestive Surgeon in Moewardi Hospital Surakarta, Indonesia.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

Editor(s):

- (1) Dr. P. Veera Muthumari, V. V. Vanniaperumal College for Women, India.
- (2) Dr. Syed Faisal Zaidi, King Saud Bin Abdulaziz University, KSA.
- (3) Dr. Pramod Kumar Sharma, All India Institute of Medical Sciences, Jodhpur, India.

Reviewers:

- (1) Mateescu Garofita-Olivia, University of Medicine and Pharmacy Craiova, Romania.
- (2) Shamala Moodley, Mangosuthu University, South Africa.
- (3) Gongsheng Yuan, University of Pennsylvania, USA.
- (4) Wulandewi Marhaeni, Lambung Mangkurat University, Indonesia.
- (5) Mikaela Clotilde da Silva, State University of Paraiba, Brazil.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/68527>

Original Research Article

Received 16 March 2021

Accepted 22 May 2021

Published 24 May 2021

ABSTRACT

Background: In the era of COVID-19 pandemic, various procedures have been carried out to prevent the virus transmission, and emergency surgery on COVID-19 patients is reconsidered and extremely challenging. One of the most common emergency procedures is gastrointestinal surgery. Elective surgery could be reschedule later, however, in the emergency setting, we must face to the higher risk condition for both patients and the surgeon. Emergency surgery on confirmed positive COVID-19 has increased the post-operative morbidity and mortality. The aim of this study is to evaluate the type of emergency gastrointestinal (GI) surgery-emergency procedure and it's relation to in-hospital mortality related to post-operative morbidity.

Materials and Methods: This is a retrospective study which would analyzes the post-operative

*Corresponding author: Email: rickydnsturgeon@gmail.com;

morbidity and in hospital mortality on emergency GI surgery and positive COVID-19 patients. This was a single centre study, conducted at GI surgery division of Moewardi General Hospital, Indonesia from April 2020 till March 2021. All of these cases had done emergency exploratory laparotomy and already confirmed COVID-19 will be included on this study. Type of emergency cases, post-operative morbidity and mortality will be reported. The redo surgery will be excluded from this study.

Result: During 1 year period of study, we reported 39 emergency GI surgery cases. All of them has been done emergency exploratory laparotomy. The most common procedure is diffuse peritonitis due to complicated appendicitis (reported in 21 cases), Others procedures are peptic ulcer perforations (9 cases), blunt abdominal trauma (2 cases), intestinal obstruction was found in 4 cases and 3 cases of incarcerated inguinal hernia. Thirty one patients had survived following the emergency GI surgery and 8 patients did not survive. These patients had post-operative pneumonia and prolonged sepsis in the intensive care unit.

Conclusion: Emergency GI surgery on confirmed COVID-19 patients, are still challenging and has special consideration on post-operative morbidity, which leads to increased post-operative mortality rates. Although, it is a high risk procedure, multidisciplinary team should always be aware of the risk and benefit of treating emergency cases especially when facing the current pandemic of COVID-19.

Keywords: Emergency; gastrointestinal surgery; COVID-19; inhospital mortality.

1. INTRODUCTION

Pandemic is a condition of the spread of certain diseases that occur in more than one country or almost all regions across the world. It is a condition where the disease can spread out of control. In March 2020, the World Health Organization (WHO) declared COVID-19 as a pandemic. COVID-19 was first discovered in Wuhan, China, in December 2019. It causes disease in the respiratory tract WHO.

The COVID-19 pandemic has greatly affected the world's population in terms of economy, education, and health. Based on the rapid spread of the virus and many affected people, fast treatment is required. The high need for handling COVID-19 requires many health workers. Handling of COVID-19 by health workers also requires direct contact with the patient. The large number of treatments that require direct contact can expose health workers to become infected with COVID-19 while on duty. The potential for health workers to infection of virus occurs because of the lack of standardization in the use of Personal Protective Equipment (PPE) [1]. This one-of-a-kind crisis is quite a burden for hospitals, where services must respond to the influx of patients with COVID-19 and at the same time, doctors must treat other patients, who are sometimes urgent [2].

The pandemic has caused a surge in demand for health care and has forced a significant restructuring of the general surgical department

involving the cancellation of non-urgent procedures, the centralization of colorectal cancer procedures, and the conversion of outpatient clinics to telemedicine [3]. Particularly for gastroenterology practice, the effects of the pandemic have also caused delays in patient care with face-to-face consultations, and many elective endoscopic procedures have been delayed by several months. Prolonged cessation of gastrointestinal (GI) services has resulted in many gastrointestinal conditions that once could be left waiting and which now require even more urgent attention [4]. In addition, aerosol-generating (AGP) procedures, such as intubation, endoscopy, and laparoscopy, can transmit the SARSCoV-2 during this COVID-19 pandemic. This leads to guidelines that urge the cancellation of elective surgery and emphasizes caution during laparoscopy [5].

Nearly all the scheduled surgical activities, including oncology patients, have been reduced; only cases with a high risk of obstruction or perforation were selected; all other elective operations for benign pathologies were suspended [6]. If possible, alternative treatments should be explored, including neoadjuvant chemotherapy or radiation therapy. In addition, direct contact with patients should be avoided altogether [7].

The surgeon should also consider that access to the operating room is limited (many rooms are converted into ICUs) and that the risk of spreading the virus remains even in the

operating room [8] Preoperative screening is recommended for all patients undergoing surgery (using RT-PCR and/or CT scan of the chest). This is done to select the best available treatment as well as the best approach in surgery (laparoscopy or laparotomy) so that health workers can take the necessary protective measures (PPE) [6].

Health workers play a key role in responding to any pandemic crisis and become frontliners to maintain the sustainability of the pandemic response in the long term. According to a study done by Gallego et al. [9] the incidence of COVID-19 among surgeons in the General Surgery Department was high during the first period of the study. The statistics were surgeons present (23.5%) and 26.6% of the occupants of the surgical department in the department were positive. Transmission may occur in the days prior to taking action in the hospital as the incubation period for the coronavirus is 2-14 days, with a peak appearance of symptoms between days 4 and 5

2. MATERIALS AND METHODS

2.1 Patient Population

The research subjects were COVID-19 patients who underwent digestive surgery and had pneumonia comorbidity at the Central Surgical Installation of Dr. Moewardi General Hospital, Surakarta, from April 2020 to March 2021.

2.2 Sample Collection

Data were obtained from COVID-19 patients with pneumonia comorbidity who underwent action taken from patient medical records at the Central Surgical Installation of Dr Moewardi Hospital, Surakarta, in the period of April 2020 – March 2021.

Patient data were recorded including the patient database (medical record number, name, hospital admission and discharge date, birth process), patient's mother's data (name, gravidarum status), patient laboratory results, final diagnosis, treatment given, patient room unit, and the patient's discharge. The redo surgery will be excluded from this study.

2.3 Statistical Analysis

Data were analyzed quantitatively to determine the profile of the COVID-19 surgery action with the most pneumonia comorbidity at Central

Surgical Installation of Dr. Moewardi Surakarta Hospital in the period of 2020-2021 to provide an overview of population characteristics and presentation of research results descriptively. The variables in each category are summarized as numbers and percentages.

3. RESULTS AND DISCUSSION

3.1 Research Data

The study was conducted at Dr. Moewardi General Surakarta in the period of 2020-2021. In the period determined by the researcher, a total of 39 surgical procedures were performed for COVID-19 patients with pneumonia at the Central Surgical Installation of Dr. Moewardi General Hospital from April 2020 to March 2021 (27 procedures in 2020 and 12 procedures performed until March 2021).

3.2 Data Analysis Result

Data were retrieved from patient medical record data. The following is a profile of the research subjects of 39 cases outlined in tables and diagrams based on operative diagnosis, discharge conditions, and comorbidities.

Based on Table 1, COVID-19 patients undergoing surgery with pneumonia comorbidity at the Central Surgical Installation of Dr. Moewardi General Hospital in the period of April 2020 – March 2021 are characterized by the surgical diagnosis dominated by complicated appendicitis of 53.85%, peptic ulcer perforation of 23.08%, intestinal obstruction of 10.26%, incarcerated inguinal hernia of 7.69%, and abdominal blunt trauma of 5.13%. Characteristics based on the state of discharge in patients who went home alive are 79.49% and those who are dead 20.51%.

4. DISCUSSION

The health system must adapt to the era of the COVID-19 pandemic so that health services continue to run in order to prevent transmission from patient to patient, patient to health worker, or vice versa. In a situation of limited resources, services for the management of COVID-19 patients are prioritized based on the urgency of the case. Surgeons are also advised to evaluate the choice of case-by-case surgery because the spectrum of symptoms of a disease can vary at the same diagnosis and there are considerations of progression and prognosis of the disease itself.

Table 1. Characteristics of operations in COVID-19 patients in the period of April 2020 – March 2021

Characteristics	n	%
Diagnosis		
Complicated Appendicitis	21	53.85
Peptic Ulcer Perforation	9	23.08
Intestinal Obstruction	4	10.26
intarcerated Inguinal Hernia	3	7.69
Blunt Abdominal Trauma	2	5.13
Pneumonia	39	100
State of Discharge		
Alive	31	79.49
Dead	8	20.51

SARS-CoV-2 is thought to spread mainly through respiratory droplets and aerosols and close contact. In an article written by van Doreleman et al. [10] SARS-CoV-1 can remain alive and infectious in aerosols for hours to several days, causing transmission through indirect contact with a contaminated environment and occurrence of nosocomial infection [10] Several procedures have the potential to produce aerosols including endotracheal intubation and related procedures (e.g., manual ventilation, aspiration), cardiopulmonary resuscitation, bronchoscopy, surgery, and autopsy [8].

From the findings summarized in Table 1, the surgical procedures performed at the Dr Moewardi Central Surgical Installation in the period of April 2020 – March 2021 were dominated by laparoscopy, which were as many as 24 procedures (61.54%). Laparoscopy has many advantages and impacts on both respiratory function and length of stay which supports the procedure for COVID-19 and pneumonia patients [11].

De Simone et al. [8] recommend completing COVID-19 screening (RT-PCR nasopharyngeal swab test + chest imaging) for all acute surgical patients before admission to the surgical ward or operating room. This is a mandatory preventive measure to tackle the spread of the COVID-19 transmission chain. Radiological imaging can help confirm the diagnosis of COVID-19 pneumonia in surgical patients and show direct pathognomonic symptoms so that this test can be performed to shorten the screening time. The surgeon's decision to operate depends on their evaluation. Urgent surgical procedures are required if there are life-threatening

complications, high-risk patients, hemodynamic disturbances, or shock [8]

In this study, it was found that the patient's discharge condition was dominated by 31 live patients (79.49%) and 8 dead patients (20.51%). In a study by Madrazo et al. [12], in urgent surgery, infection with the SARS-CoV-2 virus appears to contribute to a significant increase in postoperative morbidity and mortality, higher than expected [12]. Presence of specific vascular lesion pneumonia, involving all mucosal and parenchymal structures, including myocytes [13]. "Cytokine storms" secondary, endothelial injury and microangiopathy, and complex interactions of the virus with the immune system may explain significant damage in some groups, particularly in elderly patients and / or with associated diseases. During the pandemic, an acute pathological state that appeared in the emergency department was at a more advanced stage and was associated with a worse postoperative state, even in patients not affected by SARS-CoV-2 [14].

Based on previous studies, emergency abdominal surgery is performed in most hospitals, and acute laparotomy is considered a high-risk procedure with a significant mortality rate ranging from 14-20%. Advanced age and perioperative conditions such as sepsis and dependent functional status increase the mortality rate by more than 50%. The general surgical population is a large group of patients who suffer from a variety of co-existing conditions and diseases. Results vary in this very heterogeneous patient group. In recent years, there has been increasing interest in describing mortality rates especially among the elderly [15]. Compared with previous research data, covid-19 virus infection also

contributed to the increased mortality and morbidity rates for patients undergoing emergency abdominal surgery. In addition, during the COVID period the number of patients referred for appendectomy was lower both proportionally and absolutely, with a higher frequency of peritonitis due to other causes (acute diverticulitis, small bowel perforation or perforated gastric ulcer) [16].

This study has a number of limitations including the fact that it does is a single center retrospective observational study make generalizations difficult. There are still other factors that can influence the results of the study which are not included. Further research is needed to find out other comorbid factors and complications of this emergency abdominal surgery for COVID-19 patients.

5. CONCLUSION

The results show that the laparotomy procedure has many advantages and impacts on respiratory function and length of stay that supports the procedure for COVID-19 patients. Given the risk of COVID-19 transmission, surgeons rely on the surgeon's decision to rely on the surgeon's evaluation based on the patient's emergency. Before surgery, it is screened to take preventive action.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCE

1. Luizeti BO, Perli VA, Costa GG, Eckert Id, Roma AM, Costa KM. Impact of the COVID-19 pandemic on surgical procedures in Brazil: A descriptive study. Research Square; 2020.
2. Besnier E, Tuech JJ, Schwarz L. We Asked the Experts: COVID-19 Outbreak: Is There Still a Place for Scheduled Surgery? "Reflection from Pathophysiological Data. World Journal of Surgery; 2020.
3. Patel R, Hainsworth A, Devlin K, Patel J, Karim A. Frequency and severity of general surgical emergencies during the COVID-19 pandemic: single-centre experience from a large metropolitan teaching hospital. The Annals of the Royal College of Surgeons of England. 2020; 102(6):457–62.
4. Francisco CP, Cua IH, Aguila EJ, Cabral-Prodigalidad PA, Sy-Janairo ML, Dumagpi JE, Co J. Moving Forward: Gradual Return of Gastroenterology Practice during the COVID-19 Pandemic. Digestive Diseases; 2020.
5. Chew MH, Chau KC, Koh FH, Ng A, Ng SP, Ng SF, Ong BC. Safe operating room protocols during the COVID-19 pandemic. British Journal of Surgery; 2020.
6. Nugroho A, Arifin F, Widiyanto P, Wibowo AA, Handaya AY, Kristian I, Warsinggih. Digestive Surgery Services in COVID-19 Pandemic Period: Indonesian Society of Digestive Surgeons Position Statement. J Indon Med Assoc; 2020.
7. Andrea P, Beat M, Graziano O, Frédéric T, Christian T. Response of a European surgical department to the COVID-19 crisis. Swiss Medical Weekly; 2020.
8. De Simone B, Chouillard E, Di Saverio S, Pagani L, Sartelli M, Biffi W, Catena F. Emergency surgery during the COVID-19 pandemic: what you need to know for practice. The Annals of the Royal College of Surgeons of England. 2020;1–10.
9. Gallego MA, Casas SG, Miguelanez IP, Rubio-Pe´rez I, Serrano CB, Pena EA, Dominguez JD. SARS-CoV-2 pandemic on the activity and professionals of a General Surgery and Digestive Surgery Service in a tertiary hospital. Cirugia Espanola. 2020;320-7.
10. Van Doremalen N, Bushmaker T, Morris D, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med. 2020;382:1564–7.
11. Tuech JJ, Gangloff A, Di Fiore F, Michel P, Brigand C, Slim, K, Schwarz L. Strategy for the practice of digestive and oncological surgery during the COVID-19 epidemic. Journal of Visceral Surgery; 2020.
12. Zoilo Madrazo, Javier Osorio, Aurema Otero, Sebastiano Biondo, Sebastian Videla. on behalf of The COVID-CIR Collaborative Groupd. Postoperative complications and mortality following

- emergency digestive surgery during the COVID-19 pandemic: A multicenter collaborative retrospective cohort study protocol (COVID-CIR). *Medicine (Baltimore)*. 2021;100(5):e24409.
13. COVID Surg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. *Lancet*. 2020;396:27–38.
 14. Cano-Valderrama O, Morales X, Ferrigni CJ, et al. Acute Care Surgery during the COVID-19 pandemic in Spain: changes in volume, causes and complications. A multicentre retrospective cohort study. *Int J Surg*. 2020;80:157–61.
 15. Tolstrup MB, Watt SK, Gögenur I. Morbidity and mortality rates after emergency abdominal surgery: an analysis of 4346 patients scheduled for emergency laparotomy or laparoscopy. *Langenbeck's Archives of Surgery*. 2016;402(4):615–623.
DOI:10.1007/s00423-016-1493-1
 16. Fallani G, Lombardi R, Masetti M, et al. Urgent and emergency surgery for secondary peritonitis during the COVID-19 outbreak: an unseen burden of a healthcare crisis. *Updates Surg*. 2021;73:753–762.
Available: <https://doi.org/10.1007/s13304-020-00943-y>

© 2021 Tyastono et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

*The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/68527>*