

Brief Communication

Emergency abdominal surgeries remain unchanged in the COVID-19 affected environment: A single-center experience at a community hospital in Japan

Yasunori Nishida,  Noriaki Otagiri, and Katsunori Tauchi

Department of Surgery, Aizawa Hospital, Nagano, Japan

Aim: This study assessed whether emergency abdominal surgeries were changed in the coronavirus disease (COVID-19)-affected environment at a community hospital in Japan, with the goal of planning and preparing hospital resources against the further spread of COVID-19.

Methods: A total of 179 patients who underwent emergency abdominal surgery over 4 months during the pandemic (1 March, 2020 to 30 June, 2020) and a control period (1 March, 2019 to 30 June, 2019) were enrolled in this retrospective study. Patient demographics, hospital visiting patterns (visit time, ambulance transport, and duration of symptom onset to hospital visit), severity of patients' condition, and surgical characteristics were compared between the two periods.

Results: The number of patients undergoing emergency abdominal surgery during the pandemic did not decrease in comparison to the control period (89 patients versus 90 patients). The duration of symptom onset to hospital visit during the pandemic was not prolonged compared to the control period. Other hospital visiting patterns, severity of patients' condition, and surgical characteristics were also similar in both periods.

Conclusion: Although the situation of the pandemic was different between countries and regions, the number of emergency surgeries in our hospital remained unchanged, and those patients visited the emergency room no later than usual.

Key words: COVID-19, emergency medicine, pandemic

INTRODUCTION

CORONAVIRUS DISEASE (COVID -19) was declared a pandemic by the World Health Organization on 11 March, 2020,¹ and it has affected people worldwide on an unprecedented scale.² In Japan, a state of emergency was declared in response to COVID-19 on 7 April, 2020.³ The statement was then broadened to include all prefectures in Japan on 16 April, 2020.⁴ During this time, health-care systems and hospitals have been heavily affected by this infectious disease.

In Japan, the government requested people to stay at home in this state of emergency. People avoided going outside unnecessarily; this applied to hospital visits as well.

Consequently, the number of outpatient visits gradually decreased,⁵ and elective procedures were postponed or cancelled at heterogeneous levels in each hospital.^{2,6-8} However, surgical activities for emergencies could not be stopped even during the pandemic.

There have been a few reports concerning emergency surgeries during the pandemic.⁹⁻¹² It is necessary to assess the trends and details of emergency surgeries during the pandemic for planning and preparing hospital resources against further spread of COVID-19. Thus, this study assessed whether emergency abdominal surgeries were changed in the COVID-19 affected environment at a community hospital in Japan.

METHODS

A RETROSPECTIVE REVIEW assessed patients who underwent emergency abdominal surgery at Aizawa Hospital (Matsumoto, Japan) during two study periods. The pandemic period extended from 1 March, 2020 to 30 June, 2020, which was approximately 4 months during the state

Corresponding: Yasunori Nishida, MD, PhD, Department of Surgery, Aizawa Hospital, 2-5-1 Honjou Matsumoto, Nagano, 390-8510 Japan. Email: yasunori.198129@gmail.com

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of emergency. The control period extended from 1 March, 2019 to 30 June, 2019. Patients who did not visit the emergency room (ER) were excluded from this study (e.g., those with complications arising from an elective procedure or unexpected onset during hospital treatment for other diseases). Approval for the study and a waiver of informed consent were obtained from the Institutional Review Board of Aizawa Hospital (#2020-031).

Our institution is a community hospital in Matsumoto, Nagano, Japan, containing 460 patient beds. Emergency systems and human resources of our hospital were the same between the two study periods. Approximately 12 surgeons were responsible for undertaking elective and emergency abdominal surgeries. The number of abdominal surgeries was approximately 1,000 every year. Nearly 30% of these surgeries were carried out in an emergency setting. The rate of emergency abdominal surgeries admitted to an intensive care unit postoperatively in 2019 was 39.7% (125/315 surgeries). The number of elective surgeries decreased during the period that included the state of emergency compared to the same period in 2019 (48 cases versus 71 cases). The ER is open 24 h a day, 7 days a week, and treats any patient who comes through our doors. Although patients with suspected COVID-19 can visit the ER and be examined, patients with confirmed COVID-19 are not referred to or treated at our hospital. During the pandemic, protecting our medical staff and patients from hazards and infections is an enormous responsibility. Emergency surgeries, even during this time, could still be carried out, as in ordinary times, with special attention to COVID-19. Preoperative screening of COVID-19 infection was not routinely carried out.

Medical records were reviewed to collect the following data: patient demographics, hospital visit time, ambulance transport, duration of symptom onset to hospital visit, American Society of Anesthesiologists classification score,¹³ laboratory data, systemic inflammatory response syndrome score,¹⁴ surgical characteristics, and postoperative hospital stay.

All the analyses were undertaken using the IBM SPSS Statistics 21 software package (IBM, Armonk, NY, USA). The Mann–Whitney *U*-test was used to compare continuous variables, and the χ^2 -test was used to compare categorical variables. A *P*-value less than 0.05 was considered statically significant.

RESULTS

A TOTAL OF 179 patients underwent emergency abdominal surgery during the two study periods. Of these patients, 90 patients underwent surgery in 2019 (control group), and the other 89 patients in 2020 (pandemic

group). The numbers of patients are shown in Figure 1A. The number of patients who underwent emergency abdominal surgery during the pandemic did not decrease in comparison to the control period, but the total number of patients who visited the ER during the pandemic (7,314 patients) was 27.3% less than during the control period (10,063 patients).

Patient characteristics are shown in Table 1. Hospital visiting patterns, such as hospital visit time and ambulance transport, were not different between both groups. In the pandemic group, the duration of symptom onset to hospital visit was not prolonged compared to the control group (median, 12.0 h versus 12.0 h). Regarding the severity of patients' condition, no differences were seen in the American Society of Anesthesiologist scores, white blood cell count, serum C-reactive protein levels, and systemic inflammatory response syndrome scores between the two groups. Laparoscopic surgery was carried out less frequently in the pandemic period (19.1% versus 26.7%), but the difference was not statistically significant.

The diagnoses during the control and pandemic periods are shown in Figure 1B. There were no traumatic cases during the pandemic period, whereas four patients with traumatic injuries of the abdominal organs required emergency surgery during the control period.

Regarding patient characteristics, especially during the state of emergency (16 April–14 May, 2020), no difference in any variable was seen between the two groups (data not shown).

DISCUSSION

THIS STUDY REVEALED the trends and details of emergency abdominal surgeries in the COVID-19 affected environment at a community hospital in Japan. Even during the time influenced by the COVID-19 pandemic, the number of emergency surgeries remained unchanged, and these patients visited the ER no later than usual.

There are some reports concerning ER visits and emergency surgeries during the COVID-19 pandemic.^{9–12} Patel and colleagues of a large metropolitan teaching hospital in the UK reported that fewer patients were referred to the emergency general surgical team during lockdown compared to pre-lockdown.⁹ In this study, the total number of ER visits decreased during the pandemic, following similar trends that have been seen in most regions worldwide. Furthermore, recent reports have shown that the pandemic caused a major decrease in the number of emergency surgical procedures,^{10,12} but the numbers in this study did not significantly change even during the pandemic. Our hospital

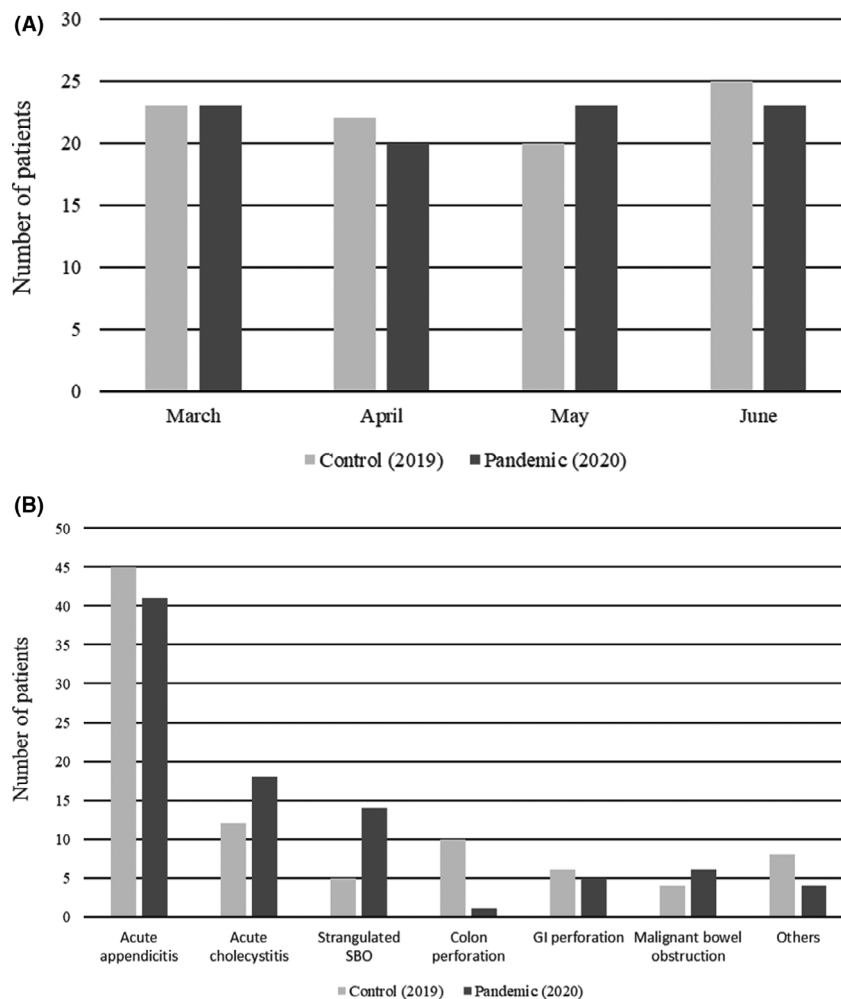


Fig. 1. A, Number of emergency abdominal surgeries carried out during the control period (1 March, 2019–30 June, 2019) and the pandemic period (1 March, 2020–30 June, 2020) at a community hospital in Japan. B, Diagnoses of emergency abdominal surgeries carried out during the control and pandemic periods. GI, gastrointestinal; SBO, small bowel obstruction.

did not treat patients with confirmed COVID-19 during the pandemic period. Patients wanted to avoid being infected during their stay in the hospital. Also, in the area around our hospital, there are no other hospitals which patients can visit at any time. Therefore, the number of patients might not decrease in our hospital. This discrepancy would depend on the capacity and function of each hospital in combating COVID-19 and undertaking abdominal emergencies.

Delays in arriving at the hospital during the pandemic is another problem mentioned in recent reports.^{9–11} Conversely, our results showed that the duration of symptom onset to hospital visit was not prolonged, even during the time influenced by the COVID-19 pandemic. The delays found in previous studies occurred because patients want to avoid being infected with COVID-19. Indeed, the epidemic

of the infection in the prefecture in which our hospital is located was less severe compared with those in areas around Tokyo. The maximum number of patients diagnosed with COVID-19 infection during the pandemic period was seven per day in our prefecture. Such a situation with the minor epidemic might impact on the results of this study. The timing of the hospital visit would be affected by the degree of spread in each region.

In our hospital, supply issues of medical materials did not influence decision-making for the surgical approach. However, limited supply must impact on surgical activities negatively. Regarding the operative procedure, a decrease in the number of patients undergoing laparoscopic procedures was observed in other studies.¹¹ In this study, laparoscopic approaches were used less frequently in the pandemic

Table 1. Characteristics of patients who underwent emergency abdominal surgery during the COVID-19 pandemic (1 March, 2020–30 June, 2020) or the control period (1 March, 2019–30 June, 2019) at a community hospital in Japan

	Control (n = 90)	Pandemic (n = 89)	P-value
Age, years	49.0 (5–98)	60.0 (15–96)	0.170
Male gender	49 (54.4)	48 (53.9)	0.945
Night-time admission	24 (26.7)	27 (30.3)	0.586
Ambulance	31 (34.4)	22 (24.7)	0.154
Duration of symptom onset to hospital visit, h	12.0 (0.5–96)	12.0 (0.3–120)	0.831
ASA score, I/II/III/IV	26/45/18/1	22/48/18/1	0.969 [†]
White blood cell count, /mL	12,185 (1,450–27,210)	11,480 (4,480–25,000)	0.477
Serum C-reactive protein level, mg/dL	1.4 (0.0–38.0)	2.0 (0.0–43.1)	0.283
SIRS score ≥ 2	27 (30.0)	16 (21.3)	0.185
Laparoscopic surgery	24 (26.7)	17 (19.1)	0.228
Operative time, min	89.5 (23–293)	88.0 (20–224)	0.632
Blood loss, mL	10.0 (1–7430)	15.0 (1–420)	0.547
Postoperative length of stay, days	5.0 (1–57)	6.0 (1–61)	0.982

Continuous parameters are presented as median (range) and categorical parameters are presented as n (%). SIRS, systemic inflammatory response syndrome.

[†]American Society of Anesthesiologists (ASA) score I/II versus III/IV.

period, but the difference was not statistically significant. Even though there is no data suggesting the spread of the COVID-19 virus in aerosols produced during laparoscopic surgery, such as surgical smoke,^{2,15} the surgical approach (open or laparoscopic) should be decided according to recommendations published by scientific societies.^{15–17}

Non-operative management could be first attempted in patients with acute appendicitis and acute cholecystitis, especially during the pandemic.^{17,18} However, a conservative approach might sometimes have a longer duration, requiring longer hospital stay, and with higher chance of failure. The treatment option should be decided with consideration of each patient's condition, severity of the inflammation, and existing guidelines.^{2,17}

In Japan, the impact of the COVID-19 pandemic on emergency abdominal surgeries is still not extensively investigated; this study is the first to reveal the trends and details. However, it is important to note that the situation of the pandemic is different between countries and regions. Moreover, the function of each hospital in response to COVID-19 is also different. These trends can also change if the situation of the pandemic worsens. This study is only a single-center experience at a community hospital in Japan. Although many reports and information from various hospitals are needed to investigate the situation during the pandemic, the results of this study could be useful to plan and prepare hospital resources against the further spread of COVID-19. Even during the time influenced by the COVID-19

pandemic, abdominal emergencies still occurred in the same manner as usual. Surgical activity for emergencies is essential to combat the pandemic along with strong resources for a proper response to COVID-19.

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DISCLOSURE

Approval of the research protocol: The protocol was approved by the Institutional Review Board of Aizawa Hospital (#2020-031).

Informed consent: The requirement for informed consent of the patients was waived.

Registry and the registration no. of the study/trial: N/A.

Animal studies: N/A.

Conflict of interest: None.

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