World Journal of Clinical Cases

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World J Clin Cases 2020 September 6; 8(17): 0-0

DOI: 10.12998/wjcc.v8.i17.0000

ISSN 2307-8960 (online)

ORIGINAL ARTICLE

Retrospective Study

Emergency surgery in COVID-19 outbreak: Has anything changed? Single center experience

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Institutional review board statement: This study was reviewed and approved by the Ethics Committee of the Area Vasta Emilia Centro, Italy.

Informed consent statement: Patients were not required to give informed consent to the study because the high risk of biological contamination. The analysis used anonymous clinical data that were

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Abstract

BACKGROUND

The current coronavirus disease 19 (COVID-19) pandemic is changing the organization of health care and has had a direct impact on the management of surgical patients.At the General Surgery Department of Sant'Anna University Hospital in Ferrara, Italy, surgical activities were progressively reduced during the peak of the COVID-19 outbreak in Italy. During this period, only one operating room was available for elective cancer surgeries and another for emergency surgeries. Moreover, the number of beds for surgical patients had to be reduced to provide beds and personnel for the new COVID-19 wards.

AIM

To compare 2 different period (from March 9 to April 9 2019 and from March 9 to April 9 2020), searching differences in terms of number and type of interventions in emergency surgery of a main University Hospital in Ferrara, a city in Emilia Romagna region, North of Italy.

METHODS

This retrospective study was carried out at the General Surgery Department of Sant'Anna University Hospital in Ferrara, Italy. We examined the number of emergency surgeries performed and patient outcomes during the peak of the COVID-19 outbreak in Italy and subsequent total lockdown. We then drew a comparison with the number of surgeries performed and their outcomes during the same period in 2019. The study examined all adult patients who underwent emergency surgery from March 9 to April 9, 2019 (n = 46), and those who underwent surgery during the first month of the lockdown, from March 9 to April 9, 2020 (n = 27). Analyses were adjusted for age, gender, American Society of

obtained after each patient agreed to treatment by written consent.

Conflict-of-interest statement: We have no financial relationships to disclose.

Data sharing statement: No additional data are available.

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Manuscript source: Invited manuscript

Received: May 23, 2020
Peer-review started: May 23, 2020
First decision: June 19, 2020
Revised: July 22, 2020
Accepted: August 27, 2020
Article in press: August 27, 2020
Published online: September 6, 2020

P-Reviewer: Xia Z
S-Editor: Zhang L
L-Editor: A
P-Editor: Li JH

Anesthesiologists classification scores and types of surgery.

RESULTS

A total of 27 patients underwent emergency surgery at Sant'Anna University Hospital in Ferrara during the first month of the lockdown. This represents a 41.3% reduction in the number of patients who were hospitalized and underwent emergency surgery compared to the same period in 2019. The complication rate during the pandemic period was substantially higher than it was during the analogous period in 2019: 15 out of 27 cases from March 9 to April 9, 2020 (55) *vs* 17 out of 46 cases from March 9 to April 9, 2019 (36.9). Of the 27 patients who underwent emergency surgery during the pandemic, 10 were screened for COVID-19 using both thorax high resolution computerized tomography and a naso-pharyngeal swab, while 9 only underwent thorax high resolution computerized tomography. Only 1 patient tested positive for SARS-CoV-2 and died following surgery.

CONCLUSION

There was a significant reduction in emergency surgeries at our center during the COVID-19 pandemic, and it is plausible that there were analogous reductions at other centers across Italy.

Key words: COVID-19; Emergency surgery; Outbreak

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Core tip: The current coronavirus disease 19 pandemic is changing the organization of health care and has had a direct impact on the management of surgical patients. In this article, we highlight how this outbreak could change the flow of surgical patients for many reasons, compared to the same period before pandemic in the main University hospital with an urban population. Data were retrospectively collected using SAP (Systeme, Anwendungen, Produkte in der Datenverarbeitung) database and the Ormaweb (Dedalus Spa) operating registry. There was a significant reduction in emergency surgeries at our center and it is plausible that an analogous reduction will occur in other hospitals.

Citation: D'Urbano F, Fabbri N, Koleva Radica M, Rossin E, Carcoforo P. Emergency surgery in COVID-19 outbreak: Has anything changed? Single center experience. *World J Clin Cases* 2020; 8(17): 0-0
URL: https://www.wjgnet.com/2307-8960/full/v8/i17/0.htm
DOI: https://dx.doi.org/10.12998/wjcc.v8.i17.0000

INTRODUCTION

Since the first outbreak of the new coronavirus disease 19 (COVID-19) in Wuhan, China in December 2019, the virus has spread globally, infecting almost 5 million people to date in more than 180 countries around the world and changing the organization of healthcare.

In the face of a rapidly spreading outbreak in Italy, on March 9, 2020, the Italian government ordered a "lock down", imposing strict restrictions on the movement of the population. Citizens were only allowed to leave home when it was strictly necessary, including for work-related and health-related reasons. In addition, the lock down imposed the temporary closure of all non-essential shops and businesses.

The Italian health care system is faced unprecedented pressure, which threatened to undermine its effectiveness and sustainability. The exponential increase in emergency room visits and inpatient admission volumes in hospitals due to COVID-19 or suspected COVID-19 cases resulted in a major reduction in the surgical case loads comprising emergency or elective cancer cases.

During the lock down, at Sant'Anna University Hospital in Ferrara, Italy, all non-urgent and non-cancerous procedures were canceled so that nurses and anesthesiologists could be reallocated to cope with the COVID-19 emergency. Operating theaters were converted to intensive care unit beds where non-COVID-19

patients were relocated, further limiting the ability of the hospital to perform even urgent elective cancer surgeries.

The Department of General Surgery in Ferrara has 46 beds divided among general, thoracic and vascular surgery and an additional 24 beds dedicated to emergency surgery in a separate ward. Normally, daily surgical activity is divided among three operating rooms for elective surgeries and one for emergency surgery.

Within the first weeks of the outbreak, surgical activities were progressively reduced to the point that only one operating room per day was available for elective cancer cases and another operating room for emergency surgery. Moreover, the number of beds used for surgical patients had to be reduced to dedicate beds and personnel to the new COVID-19 wards. The emergency surgery Unit and Uro-Gynecology Unit became COVID-19 wards, and all their beds were merged together in the General Surgery Department, together providing 46 beds between General, Thoracic, Vascular, emergency surgery and Uro-Gynecology.

The aim of the present study was to investigate whether there was a difference in the number of emergency surgeries performed and patient outcomes during the March-April 2020 peak of the COVID-19 emergency compared to the exact same period in 2019.

MATERIALS AND METHODS

This retrospective study was carried out in the General Surgery Department of the Sant'Anna University Hospital in Ferrara, Italy. We examined all the adult patients who underwent emergency surgery from March 9 to April 9, 2019 and during the first month of the lock down, from March 9 to April 9, 2020. The data collected included the patient's age, gender, American Society of Anesthesiologists score, type of surgery, postoperative complications and postoperative hospital stay. Postoperative complications were defined as wound infections, pneumonia, bleeding and anastomosis leaks.

During the lock down period, COVID-19 screening with high resolution computerized tomography (HRTC) and nose-pharyngeal swabs was carried out only in the event of clear symptoms or recent contact with a COVID-19 positive patient. All suspected COVID-19 patients were assigned to designated COVID-19 operating areas[1].

Patient data were collected through the following: (1) The SAP (Systeme, Anwendungen, Produkte in der Datenverarbeitung) database of the hospital; (2) The archive of scanned folders to e-care CUP (centro unico di prenotazioni) 2000; and (3) The Ormaweb (Dedalus Spa) operating registry.

Our study was approved by the Clinical Institute Ethics Committee, and the need for informed consent from patients was waived because of the retrospective design of the investigation.

RESULTS

A total of 27 patients underwent emergency surgery at Sant'Anna University Hospital in Ferrara during the first month of lock down, between March 9 and April 9, 2020 compared to 46 patients who underwent emergency surgery in the same period in 2019. Hence, there was an overall (41.3) reduction in the number of patients who were hospitalized and underwent emergency surgery during the lock down period.

The mean age was slightly higher in 2019 than it was 2020 (65 years *vs* 63.5 years), and both groups had a higher proportion of male patients. The details of the types of surgeries performed for specific diagnoses and the patients' American Society of Anesthesiologists scores are reported in Tables 1 and 2.

The complication rate during the pandemic increased substantially to 15 out of 27 cases (55.5), compared to 17 out of 46 cases (36.9) recorded in 2019. The mean length of hospitalization in 2019 was 16.5 d, ranging from 1 to 53 d, while in 2020, it was 12.9 d, ranging from 3 to 35 d. The fatality rate after surgery during the pandemic decreased to (11.1) compared to the (19.6) rate recorded in 2019. Table 3 Among the 27 patients who underwent emergency surgery during the pandemic, 10 patients were screened for COVID-19 with both thorax HRTC and a nose-pharyngeal swab, and 9 patients were only subject to thorax HRTC. Only 1 patient was found to be positive for SARS-CoV-2 and died after surgery (Table 4).

Table 1 Baseline characteristics and perioperative variables of all study population

	Year of surgery (between March and April), 2019 (*n* = 46), 2020 (*n* = 27)
Sex, *n* (%)	
Male	25 (54.3), 15 (55.5)
Female	21 (45.7), 12 (44.5)
Mean age	65 (20-92), 63.5 (30-87)
American Society of Anaesthesiologists score, *n* (%)	
1	3 (6.5) 0
2	12 (26.2), 4 (14.9)
3	25 (54.3), 21 (77.7)
4	5 (10.8), 2 (7.4)
5	1 (2.2), 0

Table 2 Admission for specific diagnosis and type of surgery in 2019 and 2020

Procedure [*n* (%)], 2019 (*n*= 46)	2020 (*n* = 27)
Laparoscopic cholecystectomy 8 (17.4)	3 (11.1)
Laparotomy cholecystectomy 2 (4.3)	3 (11.1)
Appendectomy 9 (19.7)	0
Hemothorax/Pneumothorax/Pleural effusion 4 (8.6)	4 (14.9)
Gastrointestinal perforation 5 (10.9)	3 (11.1)
Bowel obstruction 7 (15.2)	9 (33.3)
Bowel infarction 3 (6.5)	1 (3.7)
Hemoperitoneum evacuation 3 (6.5)	0
Gastrointestinal bleeding 1 (2.2)	1 (3.7)
Fasciotomy/Abcess drainage/hematoma drainage 3 (6.5)	3 (11.1)
Other surgery 1 (2.2)	0
Total postoperative hospital length of stay (d) 16.5 (1-53)	12.9 (3-35)

Table 3 Surgical outcomes and vital status for emergency surgery2019 (*n* = 46), 2020 (*n* = 27)

Post-operative complications 17 (36.9), 15 (55.5)
Alive 37 (80.4), 24 (88.9)
Dead 9 (19.6), 3 (11.1)

DISCUSSION

The main finding of the present study was the dramatic reduction in the number of emergency surgeries at our center during the March-April 2020 peak of the COVID-19 emergency in Italy. This finding probably reflects what occurred across Italy during this period. In fact, admissions for surgical emergencies at the emergency room at our hospital were halved during the pandemic compared to the same period in the previous year. The identification of the mechanisms leading to this reduction in admissions for surgical emergencies is beyond the scope of the present work.

Nevertheless, we can assume that multiple factors likely contributed to the phenomenon. First, the fear of contagion at the hospital may have discouraged access to the emergency room, particularly after the media disseminated the news that the virus was easily spread among hospitalized patients and health care workers due to the lack of personal protective equipment.

Table 4 Preoperative investigations and coronavirus diseasepositive patients

Screening for COVID-19	Data lockdown 2020 (*n* = 27)
Only HRTC for COVID-19, *n* (%)	9 (33.3)
Pharyngeal swab and HRTC for COVID-19, *n* (%)	10 (37)
Swab (positive for SARS-CoV-2)	1 (3.7)
Swab (negative for SARS-CoV-2)	9 (96.3)

HRTC: High resolution computerized tomography; COVID-19: Coronavirus disease 19.

A second hypothesis is linked to the fact that the emergency medical system was focused on COVID-19, and most healthcare resources were reallocated to manage the crisis. This focus on the COVID-19 emergency may have led medical staff to defer less urgent cases. In line with this hypothesis is the reduction in hospitalizations for acute appendicitis. Specifically, not a single appendectomy was performed during the pandemic, while nine appendectomies were performed during the analogous period in 2019. In fact, as suggested by Collard *et al*[2]. In their review, management of non-complicated acute appendicitis in adults should be adapted to each health care facility and its capabilities. In the case of our center, medical treatment with oral antibiotic therapy alone is an option in the case of non-accessibility to the operating room, non-availability of the necessary OR staff or the fact that all the post-intervention beds are occupied by COVID-19 positive patients, creating an increased risk of infection of the patient who must undergo surgery[2]. It should again be pointed out that during the peak of the COVID-19 outbreak, our bed capacity for surgical patients was reduced by over 50.

Finally, we cannot completely exclude the possibility that a true reduction in traumas as a result of the lock down, which imposed restrictions on the movement of the population, may have contributed to the reduction in hemoperitoneum evacuation for abdominal traumas.

Furthermore, the higher complication rate following surgery that was reported during the lock down period may stem from the fact that surgical patients were reaching out to the hospital too late, even though the sample size of the present study was small and can't be statistically relevant in terms of mortality and complications rate.

A similar reduction in hospitalizations for Acute Myocardial Infarction was also recorded during the March-April 2020 peak of COVID-19 pandemic across Italy[3].

CONCLUSION

There was a significant reduction in emergency surgeries at our center during the March-April 2020 Lock down phase of the COVID-19 pandemic, and it is plausible that an analogous reduction occurred across Italy for the reasons we cited above. It is our hope that the conventional tendency to offer aggressive diagnoses and treatments to too many patients in surgical settings and beyond will be reassessed and reconsidered thanks to the experience acquired during this unprecedented epidemiological crisis.

ARTICLE HIGHLIGHTS

Research background

The current coronavirus disease 19 pandemic is changing the organization of health care and has had a direct impact on the management of surgical patients.

Research motivation

In this article, we highlight how this outbreak could change the flow of surgical patients for many reasons, compared to the same period before pandemic in the main University hospital with an urban population.

Research objectives

This study wants to compare 2 different period (from March 9 to April 9 2019 and from March 9 to April 9 2020), searching differences in terms of number and type of interventions in emergency surgery of a main University Hospital in Ferrara, a city in Emilia Romagna region, North of Italy.

Research methods

Data were retrospectively collected using SAP (Systeme, Anwendungen, Produkte in der Datenverarbeitung) database and the Ormaweb (Dedalus Spa) operating registry.

Research results

A total of 27 patients underwent emergency surgery at Sant'Anna University Hospital in Ferrara during the first month of lock down, between March 9 and April 9, 2020 compared to 46 patients who underwent emergency surgery in the same period in 2019. The complication rate during the pandemic increased substantially to 15 out of 27 cases (55.5), compared to 17 out of 46 cases (36.9) recorded in 2019. The mean length of hospitalization in 2019 was 16.5 d, ranging from 1 to 53 d, while in 2020, it was 12.9 d, ranging from 3 to 35 d. The fatality rate after surgery during the pandemic decreased to (11.1) compared to the (19.6) rate recorded in 2019.

Research conclusions

There was a significant reduction in emergency surgeries at our center and it is plausible that an analogous reduction will occur in other hospitals.

Research perspectives

It is desirable that the countries affected by the pandemic reorganize their surgical activities and health workers.

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