Effect of coronavirus disease 2019 lockdown on admission of surgical emergencies at Ain Shams University Hospital

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Background
Globally speaking, the COVID-19 pandemic has had a significant impact on healthcare services. Several publications about the restructuring of surgical activity during the COVID-19 pandemic have been written, but few of them have specifically addressed the effects of this restructuring on the emergency and trauma surgery. The goal of this study was to evaluate the impact of the COVID-19 pandemic and Egypt's national lockdown on admissions for acute surgical conditions at Ain Shams University Hospitals and compare those numbers to any existing international literature.

Methods
The data were collected from the records of the surgical emergency department at Ain Shams University Hospital (El-Demerdash) for the period of national lockdown in the months of March, April, May and June 2020 and compared this with the data of the year 2019.

Findings and Results
Total patients' visits in the period from first of March till the end of June 2020 was 10294 patients visits with average daily visits 84, while it was 15672 with average daily visits 128 in the same period of 2019. There was a slight increase in the percent of admission from total visits from 30% in the period of March to June 2019 to 32% in the lockdown period in 2020, which means slight decrease of the unnecessary patients visits. The percent of emergency room (ER) operations of total admissions increased in the lockdown period which refer to the decrease in the number of conservatively managed patients of admitted patients.

Conclusion
The COVID-19 pandemic had its impact on the surgical emergency departments all over the world. It reduced the number of avoidable non-emergency ER visits, but in same time, it hasn't stopped patients with high-risk surgical emergencies from getting urgent care. Also, during the pandemic surgeons delt with more severe conditions and complications as a result of the pandemic.

Keywords:
COVID-19, COVID pandemic, Emergency Surgery, Surgical Emergency

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Introduction

The coronavirus disease 2019 (COVID-19) infection was discovered in December 2019 in China and has since expanded globally. COVID-19 is caused by the novel virus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). On March 11, 2020, the World Health Organization classified the infection to be a pandemic [1].

Global healthcare systems have been significantly impacted by the COVID-19 pandemic. There was a huge increase in the number of patients visiting hospitals all over the world, and as a response to this, redistribution of the hospital staff occurred in order to deal with the disease burden, but this led to significant delay in the elective surgeries which was postponed to save the hospital resources to deal with the pandemic [2].

The fast spread and the impact of the COVID-19 virus on public health have forced the governments all over the world to take new measures to try to decrease the rate of infection and overall impact on the population, these measures included the lockdown forcing the social distance between people associated with the avoidance of physical contact aiming to decrease the number of the patients and hence the hospital's load [2].

Egypt forced the measures of lockdown (partial then complete) from 15th of March till the end of June 2020 in order to control the rate of infection and to control the disease load on hospitals and health care facilities.

Worldwide demand for healthcare facilities increased as a result of the pandemic, necessitating a massive redesign of hospital emergency rooms to be able to compensate the increase in the number of presenting patients during the pandemic [3].

Health care facilities had implemented certain measures in order to 'flatten the curve', the main goal of these measures is to boost the healthcare personnel, personal protective equipment, ventilators and intensive care units' capacity, one of these measures was to postpone nonurgent surgeries. Non-urgent surgeries are defined as surgical procedures for which a delay of three months or more will not substantially impact the patients [4].

After the number of COVID-19 cases began to rise and deaths associated with this disease began to surface, the number of non-COVID-19 patients admitted to hospitals had fallen. However, with the spread of the COVID-19 illness, there was a dramatic increase in the demand for hospital beds. The European Association for Trauma and Emergency Surgery (ESTES) reported a number of recommendations and strict rules for perioperative preparation for emergency surgery and trauma patients during this time to protect the healthcare professionals, these recommendations included also postponing elective cases to a later date, with the exception of some types of diseases [5,6].

Few researchers have studied the effect of the lockdown period of the COVID-19 pandemic on the emergency departments and the number of patients presented to the emergency room (ER) with complaints not related to COVID-19, surprisingly these studies found a decrease in the number of patients presenting to the ER with myocardial infarction, acute appendicitis and cholecystitis [7].

During the pandemic, people were afraid of the COVID-19 infection, and this fear had a great impact on the patient's decision to visit hospitals especially in non-COVID conditions [8].

The aim of this study is to assess the impact of nationwide COVID-19 lockdown on surgical emergency department at Ain Shams University Hospital, El Demerdash hospital in the period of lockdown and compare it with same period of the previous year as regard emergency department visits, admissions, operations, non-COVID related ICU admissions, and mortality.

Patients and methods

Methods

This is a retrospective observational study conducted at Ain Shams University Hospital. The study was approved by the ethical committee of Surgery Department, Faculty of Medicine, Ain Shams University and the consent was waived due to the observational nature of the study.

Patients

Hospital registry and patients' documents in the period of March 2019 to June 2019 and the period of lockdown from March 2020 to June 2020 were reviewed and compared as regard ER visits, admission, operations, non-COVID related ICU admission, and mortality.

The ER visits included all patients who visited the surgical ER setting with or without admission. ER admission included patients who were admitted to surgery emergency department and underwent emergency operation or those admitted and received conservative treatment for their surgical emergencies. ER operations included all surgical procedures performed upon ER patients either in the first 24 h of admission or as an urgent surgery during the admission period after failure of conservative management. Patients who were admitted for elective procedure (e.g. cancer patients) in the hospital and needed re-operation were excluded.

ICU admission in this study included all patients who needed non COVID related ICU admission from surgery emergency department either preoperatively, postoperatively, or during their conservative management, and the mortality included ICU mortality for ER surgical patients and did not include the patients admitted for elective surgery.

In the pandemic period all ER patients underwent computed tomography (CT) Chest to exclude COVID 19 patients, suspicious patients with CORAD 3 and above were transferred to Obour Hospital, Obour Hospital is one of Ain Shams University Hospitals and was dedicated for admission and isolation of covid positive patients with full surgical emergency team and setting. Patients who were tested positive during their admission and were transferred to Obour Hospital were also excluded.

The study had two groups: The control group (group A) which included patients who presented to emergency department in Ain Shams University

Hospital, El Demerdash Hospital from March 2019 to June 2019, and the pandemic group (group B) which included patients who presented to emergency department during the period of COVID-19 lockdown from March 2020 to June 2020.

Analysis

The statistical analysis was performed using the SPSS (Statistical Package for Social Sciences) ver. 26.

Results

By reviewing the patients data we found that there were 10 294 patients who visited the surgical emergency department of Ain Shams University Hospital, El Demerdash in the period of COVID-19 lockdown between March 2020 and June 2020, these patients were compared with 15 672 patients who presented to surgical emergency department in the same period of 2019, and this was highly significant *P* value=0.00 as shown in Table 1 and Fig. 1. Monthly visits in the lockdown period and the same period of 2019 are shown in Fig. 2.

As regard the patients' admissions we found that the total patients' admissions in the period of lockdown had decreased by 30% from 4769 patients in the group A to 3380 patients in group B (Lockdown group), with average monthly and daily admission in group A and group B 1192, 845, 39, and 28, respectively, with statistically significant difference *P* value 0.001 as shown in Table 2.

Moreover, there was a slight increase in the percent of admission from total visits from 30% in group A to 32% in group B, which means slight decrease of the unnecessary patients visits without statistically significant difference *P* value 0.285.

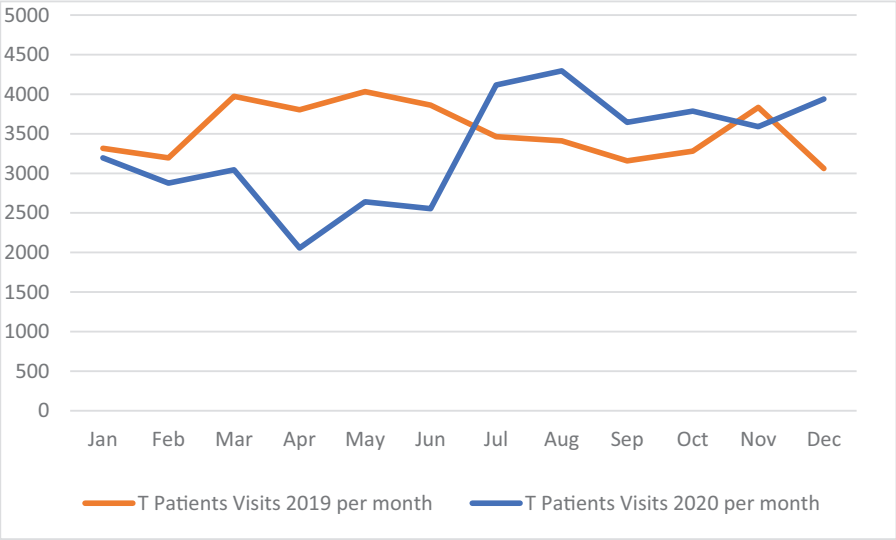
Interestingly the total patients' ER operations was comparable in the two groups with total ER operations of 1000 in group A and 964 in group B, with average daily ER operations of 8.19 and 7.90 in group A and group B with no statistically significant difference between the two groups as regard the daily ER operations with *P* value 0.584, from that we can conclude that the lockdown did not affect the total performance of Ain-Shams university hospital ER operations and it was working with its full power. Patients ER operation as the percent of operation as regard the admission are shown in Fig. 3 and Table 3.

On the other hand, by comparing the percent of ER operations of total admissions we find highly statistically significant increase in this percent in group B (*P* value 0.000) which refer to the decrease

Table 1 Patients Visits

	Total patients visit in lockdown period	Average patients visit per month	Average patients visit per day	*P* value
Group A	15672	3918	128	0.000
Group B	10294	2573	84	

Figure 1

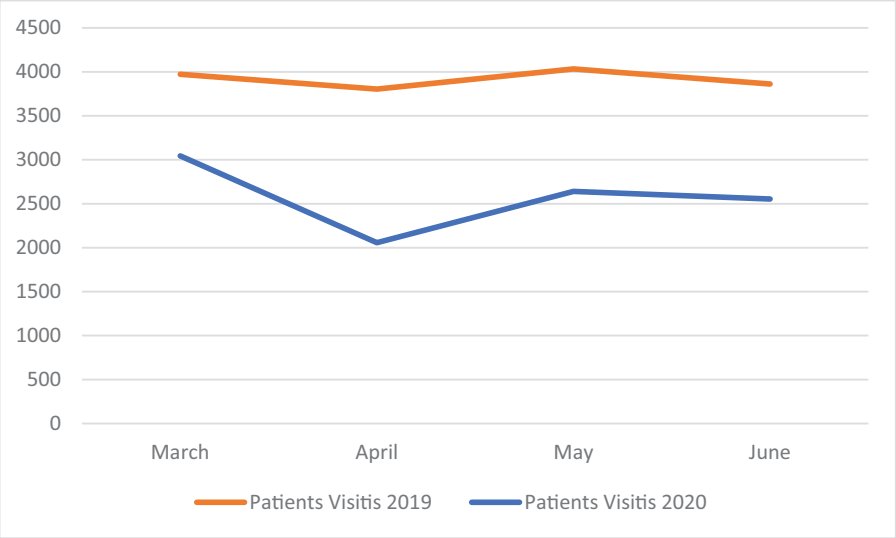


Total Patients Visits.

Table 2 Patients Admissions

	Total patients' admissions	Average patients' admissions per month	Average patients' admissions per day	*P* value	% Of admissions of total visits	*P* value
Group A	4769	1192 (41)	39 (0.77)	0.001	30.43%	0.285
Group B	3380	845 (112)	28 (3.53)		32.83%	

Figure 2

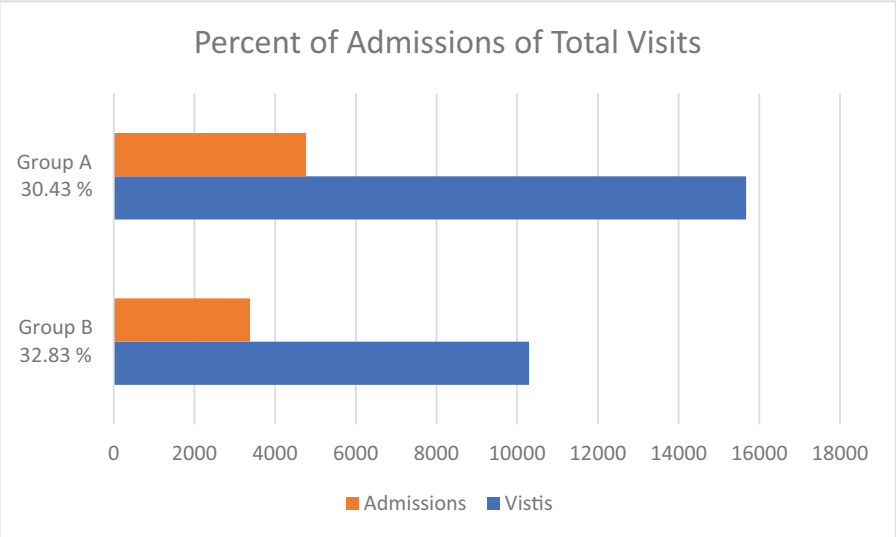


Monthly Patients Visits.

in the number of conservatively managed patients of admitted patients and when comparing the percent of ER operations of total visits we also find highly statistically significant difference between the two groups (*P* value 0.004) with considerable increase in group B which may indicate the decrease of unnecessary cases presented to ER in the period of lockdown Figs 4 and 5.

By comparing the two groups as regard the ICU admissions we can find comparable ICU admissions/ day between the groups 7.65 and 5.54 in group A and

Figure 3



Percent of admissions of total visits.

Table 3 Patients ER operations

	Total patients' ER operations	Average patients' ER operations per month	Average patients' ER operations per day	*P*-value	% Of ER operations of total admission	*P* value	% Of ER operations of total visits	*P* value
Group A	1000	250	8.19	0.584	20.98%	0.000	6.38%	0.004
Group B	964	241	7.90		28.56%		9.46%	

B, respectively without any statistically significant difference between them (*P* value 0.071), also the percent of ICU admission of total admission is almost the same between the two groups 19.57% and 19.70% in group A and group B, respectively, which indicated that there was same percentage of morbidity among the patients admitted in emergency surgery department. ICU admissions are shown in Fig. 6 and Table 4.

When comparing the two groups regarding the ICU mortality we can find the lockdown did not have any considerable effect on the ICU mortality with slight decrease in the average mortality in group B: 1.42 and 0.88 mortalities by day in group A and group B, respectively. ICU mortalities are shown in Fig. 7 and Table 5.

Discussion and review of literature

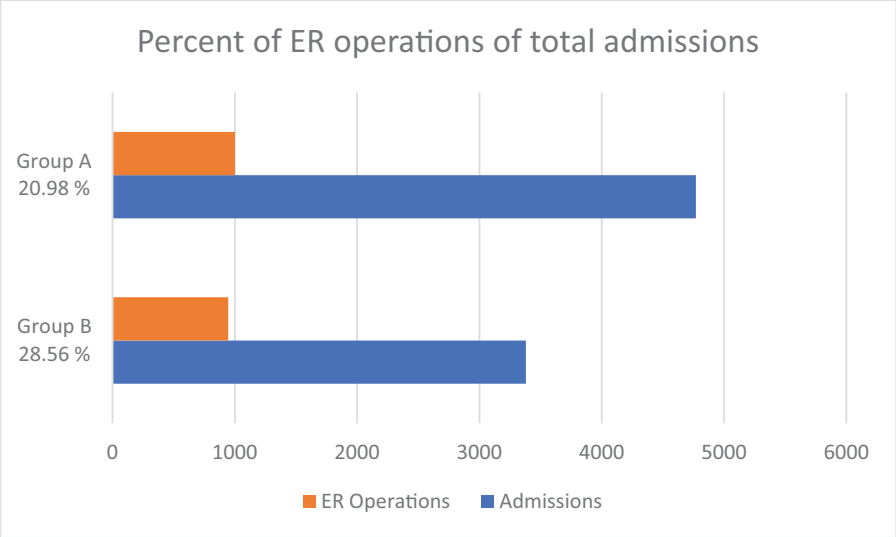
In December 2019, China's Wuhan reported a new respiratory disease outbreak. On January 12, 2020, a new coronavirus was discovered. It was initially given the name 2019 novel coronavirus (2019-nCoV) but was later given the name SARS-CoV-2. The World Health Organization designated COVID-19 as the official name of the virus-caused illness on February 11, 2020 [9].

The virus SARS-CoV-2, an enveloped nonsegmented positive-sense RNA virus, is considered the causative organism for the COVID-19 illness. And due to the resemblance between the SARS-CoV-2 and SARS-CoV-like coronaviruses found in bats, it was believed that the bats acted as the reservoir for the COVID-19 progenitor. In fact, bats have been suggested to be the original host of the virus based on the analysis of virus genome sequencing, and SARS-CoV-2 might be transmitted from bats to people through unidentified intermediate hosts [10].

The Angiotensin-Converting Enzyme 2 (ACE2) receptors which are expressed on type 1 and type 2 alveolar epithelial cells in human lungs, are the receptors for the SARS-CoV-2 virus. And the binding between the ACE2 receptors and the SARS-CoV-2 virus can result in a number of serious systemic reactions which might cause death [11].

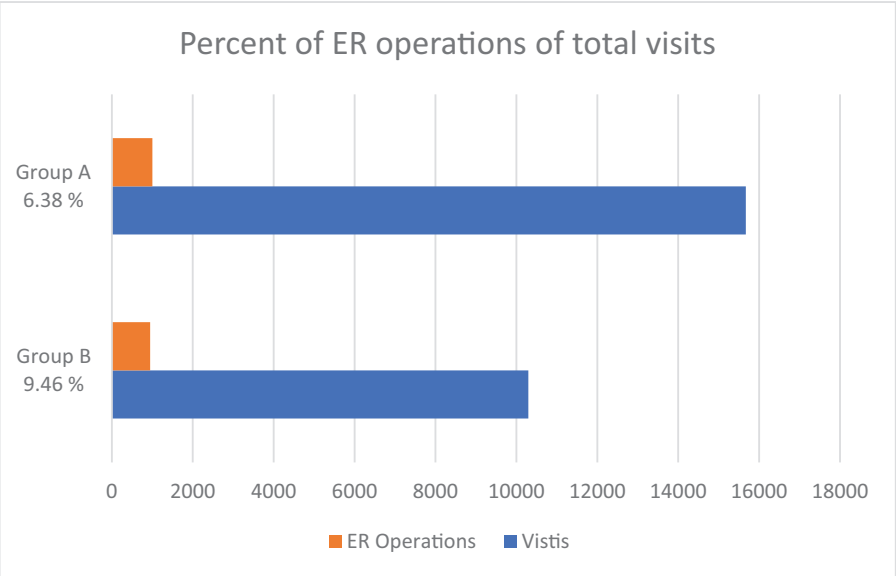
The incidence of COVID-19 infection continued to increase despite the worldwide governmental efforts to control the disease. As of March 31, 2020 there were

Figure 4



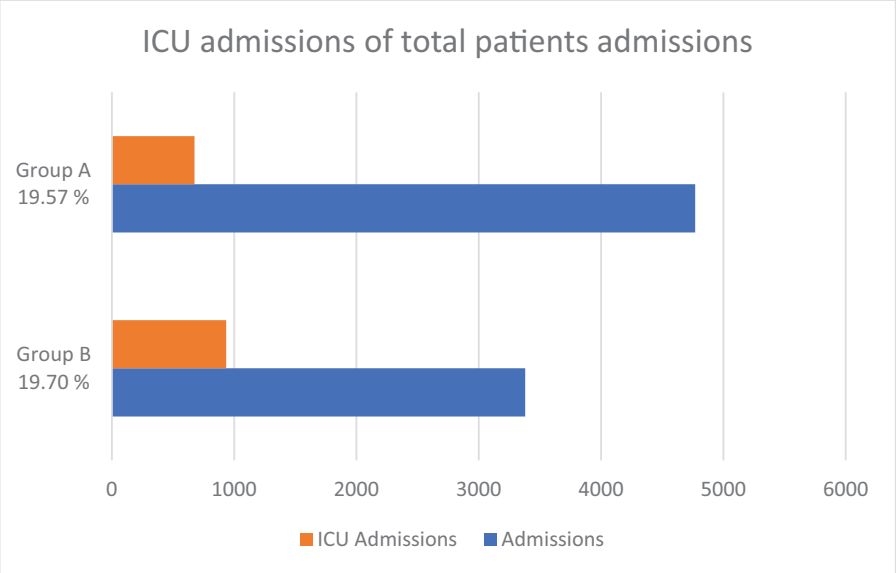
Percent of ER operations of total admissions.

Figure 5



Percent of ER operations of total visits.

Figure 6



Percent of ICU admissions of total patients admissions.

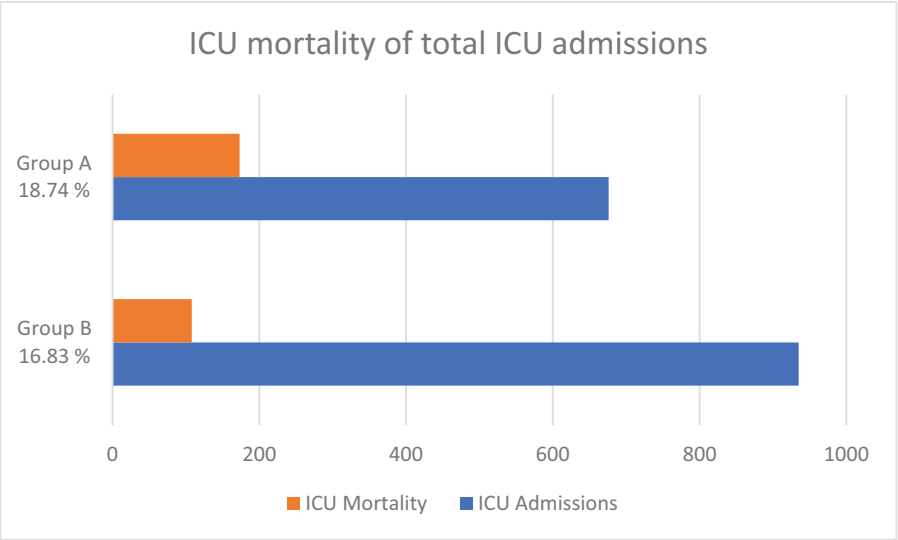
Table 4 ICU admissions

	Total ICU admissions	Average ICU admission per month	Average ICU admission per day	*P* value	% ICU admission of total patients' admission	*P* value
Group A	935	234	7.65	0.071	19.57%	0.952
Group B	676	169	5.54		19.70%	

more than 750 000 confirmed cases all over the world, including 423 000 confirmed cases in Europe, and there were more than 36 000 death all over world, including 27 000 deaths in Europe [9].

The COVID-19 pandemic which is the first pandemic of the modern era. With a very rapid spread all over the world, this rapid spread involved many European countries such as France [12], Spain [13], and Italy

Figure 7



Percent of ICU mortality of total ICU admissions.

Table 5 ICU mortality

	Total ICU mortality	Average ICU mortality per month	Average ICU mortality per day	*P*-value	% ICU mortality of total patients' admission	*P* value	% ICU mortality of ICU admissions	*P* value
Group A	173	43	1.42	0.056	3.63%	0.674	18.74%	0.659
Group B	108	27	0.88		3.27%		16.83%	

[12]. Despite the strict rules implemented in the different countries all over the world, many countries adopted a laxer strategy to fight the high incidence of infection following the example of the United Kingdom[14].

McLean *et al.*, [15] from United Kingdom stated in their study that there was decrease in the number of patients presenting to emergency departments with low-risk conditions, on the other hand the incidence of high-risk conditions presenting to emergency departments remained the same. Other study by Valderrama *et al.* [16], found an unexplained decrease in the number of some of the sever surgical conditions as bowel perforations and strangulated hernia.

These findings are consistent with our results where the total patients visits decreased in the period of the nationwide lockdown (from 15th March till the end of June 2020), Total patients' visits in the period from first of March till the end of June 2020 was 10 294 patients visits with average daily visits 84, while it was 15 672 with average daily visits 128 in the same period of 2019. With highly significant statistically difference *P* value 0.000.

This decrease in the total patients visits to the surgical emergency departments has two main reasons the first one that there was decrease in the number of trauma related visits, the second reason was due to the decrease in the number of patients with low risk conditions that preferred to stay at home during the pandemic for the fear of COVID-19 infection although that El-Demerdash Hospital was known to refer COVID-19 patients to the El-Obour hospital (One on Ain Shams University Hospitals) that was dedicated for COVID-19 patients with full surgical team and settings.

Also, a multicenter study from different eighteen general surgery departments by Rausei *et al.* [17], reported that there was 45 and 41% decrease in hospital admissions for surgical emergencies and urgent surgical interventions respectively, with no considerable difference in the management of the patients admitted during the lockdown period.

These results were nearly consistent with our study results that found that the total patients' admissions in the period of lockdown had decreased by 30% from 4769 patients in the group A to 3380 patients in group B, with average monthly and daily admission in group

A and group B 119, 845, 39, and 28, respectively, with statistically significant difference *P* value 0.001.

And when comparing the number of patients visits to patients admissions, we found that percent of admission from total patients visits had a slight increase from 30% in group A to 32% in group B, which means slight decrease of the unnecessary patients visits without statistically significant difference *P* value 0.285.

Several reasons have been postulated to explain the decrease in the number of patients presenting to surgical emergency departments and the admissions rate. The most important reason was the fear of the patients complaining of non-COVID related conditions especially low-risk conditions from visiting hospitals that receive COVID-19 patients and the possibility of acquiring the infection from those hospitals. This fear has mostly supported by media's dissemination of alarming information about the state of hospitals, including the high volume of patients with COVID, equipment shortages especially personal protecting equipment, and also supported with the absence of reassuring hospital statements regarding the care of patients with non-COVID related conditions. However, the precise causes of fear of hospitals in this period are still unknown, and there is only indirect evidence available [18].

In many health care facilities and to spare more ventilators and to reallocate healthcare personal, surgical OR were transformed into new ICUs. Elective surgeries and noncancer related surgical interventions have been postponed. Surgical emergencies and cancer patients always had the priority due to the limited resources. Patients who underwent surgical operations for cancer or for surgical emergencies and needed postoperative ICU bed were sent to special units away from the COVID-19 patients [19].

Also, the ESTES (European Association for Trauma and Emergency Surgery) recommended to postpone elective cases and to prefer the conservative management over the surgical management if the patient condition permits to preserve to resources and to reduce the risk of infection [5].

This was not consistent with results of our study, when comparing the rate of ER operation to the total number of admissions between the two groups we find that 28.56% of admitted patients had an ER operation in the lockdown period while 20.98% of admitted patients had an ER operation in the same period of 2019, with highly statistically significant difference between the two groups.

And when comparing the percent of ER operations of total visits we also find highly statistically significant difference between the two groups (*P* value 0.004) with considerable increase in group B, these results means that conservatively managed patients were less during the pandemic.

This may be due to the late presentation of the cases as most of the patients did not present early during the pandemic, or even present with complication which necessitate the immediate surgical intervention. On the other hand, some of the presenting cases to the emergency surgical departments were postponed elective cases with complications as strangulated hernias and acute on top of chronic calculary cholecystitis.

This results are consistent with Zhao *et al.* [11], and Doremalen *et al.* [20], who found sever decrease in the overall number of elective surgeries in many health care facilities and decrease in the number of complications necessitating urgent surgical intervention, but on the other hand, they found number of patients with postponed elective surgeries whose conditions has worsened, necessitating urgent hospital admission and surgical intervention.

Also, Tarim *et al.* [8], in a Turkish study found that during the pandemic surgeons dealt with more severe surgical conditions and complications which is consistent with our results.

Although there were limited resources during the pandemic of COVID-19, it was necessary to maintain the standard level of care for patients who presented with surgical emergencies [21]. And in the study by Pikoulis *et al.* [22], who studied a subset of surgical emergencies patients, they found that there was no significant differences for abdominal emergency surgical conditions as regard the hospital admission or the length of hospital stay in the different study periods, this indicated the patients with emergency surgical conditions continued to receive the suitable medical care they needed even during the pandemic and during the lockdown.

This was consistent with our study where the total number of patients' ER operations was comparable in the two groups with total ER operations of 1000 in group A and 964 in group B, with average daily ER

operations of 8.19 and 7.90 in group A and group B with no statistically significant difference between the 2 groups as regard the daily ER operations with *P* value 0.584, from that we can conclude that the lockdown did not affect the total performance of our emergency surgical department.

By comparing the two groups as regard the ICU admissions we can find comparable ICU admissions per day between the groups 7.65 and 5.54 in group A and B, respectively without any statistically significant difference between them (*P* value 0.071), also the percent of ICU admission of total admission is almost the same between the two groups 19.57 and 19.70% in group A and group B, respectively.

When comparing the two groups regarding the ICU mortality we can find the lockdown did not have any considerable effect on the ICU mortality with slight decrease in the average mortality in group B: 1.42 and 0.88 in group A and group B, respectively, this may be due to the exclusion of ICU for all suspected cases with respiratory symptoms for the fear of admission of COVID-19 positive patients and the continuous transferal of confirmed cases of COVID-19, also the numbers shows comparable percent of ICU mortality of total admissions and ICU admissions without any statistically significant difference.

These results are consistent with result of Pikoulis *et al.* [22] in his study as they found that there was no significant differences for abdominal emergency surgical conditions as regard ICU admission and the mortality rate during the pandemic and during the lockdown and also consistent with results of obtained by a study done by R.M. O'Connell, *et al.* [23] where ICU admission rate (4.6% vs. 4.6%, *P*=0.979), or in-hospital mortality (0.66% vs. 0.64%, *P*=0.972).

Conclusion

During the COVID-19 pandemic, and despite the impact of COVID-19 on the surgical emergency departments, emergency surgeons managed the surgical patients with suitable standard of care. They determined conservative management only when the condition permits. And when the surgical intervention is necessary, all precaution were taken to help reduce the exposure of the non-COVID surgical patient to the infection.

On our study there was slight decrease in the number of unnecessary surgical patients, but in the same time COVID-19 did not stop with surgical emergencies from presenting to our emergency departments, as interestingly the rate of total patients' ER operations was nearly the same between the two groups, This means that the lockdown did not affect the total performance of Ain Shams University Hospital, ElDemrdash Hospital Surgical emergency department and the emergency operations and it was working with its full power.

Also, during the pandemic the emergency surgical department dealt with more sever and complicated cases, which was indicated by the increase in the number of emergency operations in comparison to the admission rate in the lock down group when comparing it to the same period of 2019.

As regard the ICU admission and mortality there was no difference between the two groups, with comparable percentage of ICU admission to the total number of admission.

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Nil.

Conflicts of interest

The authors declare that they have no conflict of interest.

References

1 Wu F, Zhao S, Yu B, Chen Y, Wang W, Song Z, *et al.* A new coronavirus associated with human respiratory disease in China. Nature 2020; 579:265–269.

2 Mesnier J, Cottin Y, Coste P, Ferrari E, Schiele F, Lemesle G, *et al.* Hospital admissions for acute myocardial infarction before and after lockdown according to regional prevalence of COVID-19 and patient profile in France: a registry study. Lancet Public Health 2020; 5:536–542.

3 Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. JAMA 2020; 323:1239–1242.

4 American College of Surgeons. COVID-19: recommendations for management of elective surgical procedures 2020, 2020. Available: https://www.facs.org/media/b04pkoxp/recommendations_for_management_of_elective_surgical_procedures.pdf. [Accessed 2 Nov 2022]

5 Coimbra R, Edwards S, Kurihara H, Bass G, Balogh Z, Tilsed J, *et al.* European Society of Trauma and Emergency Surgery (ESTES) recommendations for trauma and emergency surgery preparation during times of COVID-19 infection. Eur J Trauma Emerg Surg 2020; 46:505–510.

6 De Simone B, Chouillard E, Di Saverio S, Pagani L, Sartelli M, Biffl W, *et al.* Emergency surgery during the COVID-19 pandemic: what you need to know for practice. Ann R Coll Surg Engl. 2020; 102:323–332.

7 Cano-Valderrama O, Morales X, Ferrigni CJ, Martín-Antona E, Turrado V, García A, *et al.* Reduction in emergency surgery activity during COVID-19 pandemic in three Spanish hospitals. Br J Surg 2020; 107:e239.

8 Tarim IA, Derebey M, Özbalci GS, Özşay O, Yüksek MA, Büyükakıncak S, *et al.* The impact of the COVID-19 pandemic on emergency general surgery: a retrospective study. Sao Paulo Med J 2021; 139:53–57.

9 World Health Organization. Coronavirus Disease 2019 (COVID-19) Situation Report – 71. HIGHLIGHTS. Geneva: WHO; 2020. Available: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200331-sitrep-71-covid-19.pdf. [Accessed 2 Nov 2022]

10 Andersen KG, Rambaut A, Lipkin WI, Holmes EC, Garry RF. The proximal origin of SARS-CoV-2. Nat Med 2020; 26:450–452.

11 Zhao Y, Zhao Z, Wang Y, Zhou Y, Ma Y, Zuo W. Single-Cell RNA Expression Profiling of ACE2, the Receptor of SARS-CoV-2. Am J Respir Crit Care Med 2020; 202:756–759.

12 Sebastiani G, Massa M, Riboli E. Covid-19 epidemic in Italy: evolution, projections and impact of government measures. Eur J Epidemiol. 2020; 35:341–345.

13 Perez-Bermejo M, Murillo-Llorente MT. The fast-territorial expansion of COVID-19 in Spain. J Epidemiol 2020; 30:236.

14 Mahase E. Covid-19: UK starts social distancing after new model points to 260 000 potential deaths. BMJ 2020; 368:m1089.

15 McLean RC, Young J, Musbahi A, Lee JX, Hidayat H, Abdalla N, *et al.* A single-center observational cohort study to evaluate volume and severity of emergency general surgery admissions during the COVID-19 pandemic: Is there a 'lockdown' effect?. International Journal of Surgery 2020; 83:259–266.

16 Cano-Valderrama O, Morales X, Ferrigni CJ, Martín-Antona E, Turrado V, García A, *et al.* Acute care surgery during the COVID-19 pandemic in Spain: changes in volume, causes and complications. A multicenter retrospective cohort study. Int J Surg 2020; 80:157–161.

17 Rausei S, Ferrara F, Zurleni T, Frattini F, Chiara O, Pietrabissa A, Sarro G. Dramatic decrease of surgical emergencies during COVID-19 outbreak. J Trauma Acute Care Surg 2020; 89:1085–1091.

18 Antonucci M, Recupero SM, Marzio V, De Dominicis M, Pinto F, Foschi N, *et al.* The impact of COVID-19 outbreak on urolithiasis emergency department admissions, hospitalizations and clinical management in central Italy: a multicentric analysis. Actas Urol Esp 2020; 44:611–616.

19 Luo Y, Zhong M. Standardized diagnosis and treatment of colorectal cancer during the outbreak of corona virus disease 2019 in Renji hospital. Zhonghua Wei Chang Wai Ke Za Zhi. 2020; 23:211–216.

20 van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, *et al.* Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. N Engl J Med 2020; 382:1564–1567.

21 Di Saverio S, Pata F, Gallo G, Carrano F, Scorza A, Sileri P, *et al.* Corona virus pandemic and colorectal surgery: practical advice based on the Italian experience. Colorectal Dis 2020; 22:625–634.

22 Pikoulis E., Koliakos N, Papaconstantinou D, Pararas N, Pikoulis A, Fotios-Christos S, *et al.* The effect of the COVID pandemic lockdown measures on surgical emergencies: experience and lessons learned from a Greek tertiary hospital. W orld J Emerg Surg 2021; 16:1.

23 O'Connell RM, Khan MA, Amir M, Bucheeri M, Khan W, Khan I Z, Barry KM. The impact of COVID-19 on emergency general surgery admissions and operative volumes: A single centre experience. Surgeon 2021; 19: e207–e212.