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Impact of COVID-19 on Emergency General Surgical Admission during the Peak and Patients' Reported Satisfaction: A Busy Trauma Centre Experience in United Kingdom

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Abstract

Aim: To assess the impact of COVID-19 on emergency general surgical admissions in a busy trauma centre during the first peak in the United Kingdom (UK).

Methods: Data was collected prospectively between March and April 2020 to compare with retrospectively collected data during an equivocal period in 2019. The main focus was the number of diagnostic computerized tomography (CT) scans and emergency surgeries performed during the COVID peak (Group A) as compared to a non-COVID period (Group B). We attempted to contact all the patients who were admitted under the emergency general surgical team during the study period to record their satisfaction.

Results: The total number of patients admitted in Group A and Group B was 191 and 272, respectively. In Group A, 41% patients had a COVID-19 swab on admission and only 8% of them were positive. In Group A, a diagnostic CT abdomen-pelvis (AP) was performed for 74% of the patients compared to 47% in Group B (p=<0.05), however 48% of patients in Group A had a CT chest as well compared to 2% in Group B (p=<0.05). There was no significant difference in the total number of emergency surgeries performed in Group A and B (p=0.12). In Group A, 15% patients had de-functioning stoma for bowel obstruction as the main indication for surgery and only one patient with a positive COVID-19 swab died after surgery. Overall, 92% patients who responded to our survey were either satisfied or very satisfied with their outcome.

Conclusion: During the COVID-19 peak, a significantly higher number of patients had diagnostic CT CAP scans; however, there was no difference in emergency surgical intervention rate.

Keywords: Surgery; COVID-19; Trauma Centre

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Introduction

COVID-19 (C-19) is a zoonotic respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) [1]. Since being declared a global pandemic by the World Health Organization [2], the C-19 pandemic has placed unprecedented strain on healthcare systems across the globe. All medical and surgical specialties have been affected by the ongoing pandemic including emergency surgery, yet the true impact of C-19 on health services is not fully understood. Our observational study aims to address this gap in research.

During the C-19 pandemic, both elective and emergency hospital services have been disrupted to reduce the hospital transmission of C-19, and to mitigate surgery-related mortality and morbidity across the globe [3]. Many surgeries in the UK have been postponed or cancelled during the peak of C-19 as per the Royal College of Surgeons (RCS) updated guidelines and the European Society of Trauma and Emergency Surgery [4].

Whilst there have been many studies that predicted or observed the effects of C-19 on cancellations of elective surgeries [5-10], there is a minimal focus on its impact on emergency surgical admissions. Additionally, given the high false negative swab rates, there are difficulties in establishing a confirmed diagnosis of C-19 and differentiating it from other viral illnesses or other types of pneumonia [11-13]. Currently reverse transcriptase-polymerase chain reaction (RT-PCR) assays from respiratory swabs and CT chest findings are considered the most reliable methods of C-19 diagnosis [14,15]. This poses a real difficulty for a surgeon in decision making regarding emergency surgical intervention for patients with suspected C-19 symptoms and therefore many patients had CT Chest during their admission. This led to an unprecedented exposure of patients to radiation in the form of either diagnostic CT AP or CT CAP. This observational study looks at the numbers of diagnostic CT scans performed during the peak of the C-19 pandemic in a busy trauma centre as compared to non-COVID period.

What does this paper add to the literature?

This is the first paper which evaluates the impact of COVID-19 on emergency general surgical admissions during its peak in a busy trauma centre based in South-west of England, comparing to non-COVID time. It provides important information about patients' reported satisfaction after hospital admission during COVID-19 peak.

Research Methodology

This is a prospective study conducted in a busy trauma centre based in South-west of England. Data on all the patients who were admitted under emergency general surgical team between 23rd March and 23rd April 2020 during the peak of C-19 pandemic in our institute was collected to compare with retrospectively collected data during the similar period in 2019. We reviewed computerized clinical records, laboratory findings and radiological imaging for all the patients, accounting for their age and gender. Extensive surgical admission data was retrieved including primary diagnosis, diagnostic scans, investigation findings, surgical intervention, and readmission rate.

The main focus was the number of diagnostic computerized tomography (CT) and emergency surgeries performed during the C-19 peak (Group A) as compared to non-COVID period (Group B). We also attempted to contact all the patients by telephones who were admitted under emergency general surgical team during our study period at our follow-up time-point of August 2020 to record their satisfaction. The 'Likert scale' was used to assess the satisfaction rate.

Results

Over the 1-month time period of our study, 191 patients were admitted at our institution under emergency general surgery team. Number of males was 46% compared to 54% females (87 males and 104 females). The median age was 66 years (Range 17- 97 years). Majority of admissions were reported by patients aged >50 years **(Figure 1)**. Main indications for admission were biliary pathology in 23%, appendicitis 11%, bowel obstruction or ischaemic bowel 10%, and diverticulitis 7% **(Table 1)**. Only 78 patients (41%) had a COVID-19 swab during their emergency admission as well as CT Chest and only 6 (8%) of them were positive.

Number of patients who underwent emergency surgical intervention were 40 (20%) and 151 (79%) were treated conservatively. Main surgical interventions were appendicectomy at 40% and laparotomy 20%. De-functioning stoma was formed in 20% patients for bowel obstruction as the main indication for surgery **(Table 2)**. In addition, 3% (6 patients) end up in ITU with mean length of stay of 6 days. Total hospital length of stay in 65% of the patients was between 1 to 3 days and 7% stayed for more than a week **(Table 3)**. Re-admission rate was 28% (54 patients) in first 4 months **(Figure 2)**.

Post-operative 30-day mortality was 8% (4 patients) and one of them had a positive COVID-19 swab. In addition, number of patients deceased during their index admission without any intervention were 8 (6%). At the time of 4 monthly FU, further 3 deaths were reported. Mortality rate was high in patients older than 70 years at 20% (13/66) and more in male than females. **Table 4** highlights admission and mortality rate for different age Groups.

In Group A, a diagnostic CT abdomen-pelvis (AP) was performed for 74% of the patients compared to 47% in Group B (p=<0.05). Interestingly, 48% of patients in Group A had a diagnostic CT Chest as well all patient who had CT Chest in Group A had PCR swap done, compared to 2% in Group B (p=<0.05). The number of patients who were treated conservatively in Group A were 138 (72%) as compared to 201 (74%) in Group B **(Table 5)**. There was no significant difference in the number of emergency surgeries performed in Group A and B (p= 0.12). **Table 2** demonstrates the type of surgical interventions in Group A and B.

The number of patients admitted to ITU were 6 (3%) in Group A compared to 15 (6%) in Group B.

In Group A, out of the RTA's admitted four had a chest drain inserted, and of the pancreatitic patients three of them had ERCP for gallstones impaction in the CBD. Furthermore, three patients presented with large bowel obstruction / sigmoid volvulas and

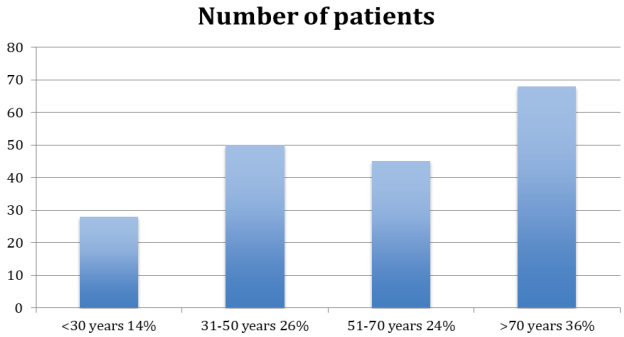

Figure 1 A graph to show the age demographics for Group A (n=191).

Table 1 Group A: Common emergency presentations and outcomes (n=191).

Emergency Presentations	No. of patients (n=191)	Surgical Intervention (n= 40)	Conservative management (n= 151)	ITU Admission (n= 6)	LOS in Hospital (Mean)	Deceased (n= 15)	Readmissions (n= 58)	COVID +ve (n= 6)
Appendicitis	21	16	5	0	1.9	0	3	0
Abscess	12	11	1	0	2.1	0	2	0
Bowel obstruction	16	3	13	1	3.3	1	10	2
Biliary colic	3	0	3	0	2.6	0	1	0
Cholecystitis	15	1	14	0	1.6	0	5	0
Colitis	5	0	5	0	4	1	0	0
Diverticulitis	12	0	12	0	3	1	5	1
Malignancy	9	2	7	0	5.6	2	3	0
Hernia	8	3	5	0	2.2	2	3	1
Ischemic bowel	3	2	1	1	4.5	2	1	0
Non-specific abdominal pain	12	0	12	0	0.5	0	0	0
Pancreatitis	24	1	23	3	2.3	1	9	1
PR bleed	7	0	7	0	2.1	0	2	0
RTA	16	0	16	0	3.3	2	2	0
Others	24	0	24	0	2.7	2	10	1
Perforated DU	1	1	0	1	3	1	-	0
Obstructive Jaundice	3	0	3	0	3	0	2	0

N.B: 1) Others include Gynecology pathology/ gastritis/ rectal prolapse/ Chest infection/ UTI/ Pyelonephritis/ Confusion

Table 2 Surgical Intervention in Group A and Group B.

Emergency Surgical Intervention	Group A (n=40)	Group B (n=60)	p-value
Laparotomy	11 (20%)	23 (38%)	0.23
Appendicectomy	16 (40%)	29 (48%)	0.43
I&D of abscess	11 (27%)	7 (10%)	0.15
Cholecystectomy	2 (5%)	1 (1%)	0.4

Table 3 Group A: Length of stay (n=191).

Length of Stay (Days)	Male (n=87)	Female (n=104)
<1	5 (6%)	10 (10%)
3-Jan	53 (61%)	71 (68%)
7-Apr	21 (24%)	18 (17%)
>7	8 (9%)	5 (5%)

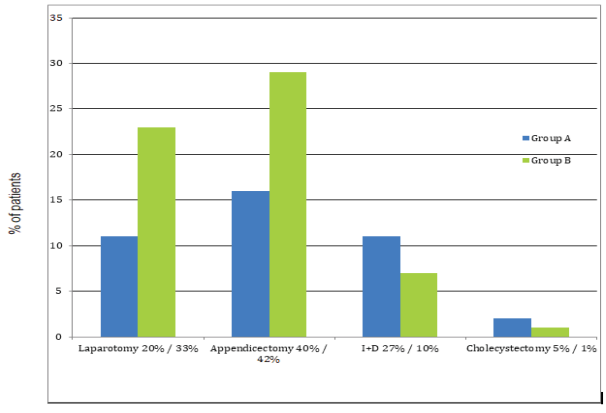

Figure 2 A comparison of the emergency surgical interventions in Group A (n=40)/Group B (n=69).

had to have flexible sigmoidscopy for decompression. Out of our 40 surgical interventions 8 patients had a stoma formed for either defunctioning or part of a laprtomy and one patient had a stoma to divert stool from his back passage as underwent extensive debridment of the perianal region for a necrotizing fasciatitis infection **(Table 6)**.

At the time of 4 monthly follow up, total number of deaths were 15 (8%). An attempt was made to contact rest of the 176 patients. The total number of patients who were contacted successfully by telephone was 75 (43%). Of the 75 patients who participated in our survey, 54 (72%) were 'Very Satisfied', 15 (20%) were 'Satisfied', 2 (3%) were 'Neutral', 3 (4%) were 'Dissatisfied' and only 1 (2%) was 'Very Dissatisfied' with the surgical care received during their admission, as shown in **Figure 3**. Overall, 92% of the patients were satisfied with their surgical outcome **(Table 7)**.

Table 4 Group A: Comparing mortality with gender and age (n=191).

Age Groups	Male (n=87)		Female (n=104)		Total (n=191)	
	N	Mortality n= 11 (%)	N	Mortality n= 4 (%)	N	Mortality n= 11 (%)
≤30	13	0 (0%)	17	0 (0%)	30 (14%)	0 (0%)
31-50	21	1 (5%)	28	0 (0%)	49 (26%)	1 (2%)
51-70	20	1 (5%)	26	0 (0%)	46 (24%)	1 (2%)
>70	33	9 (27%)	33	4 (12%)	66 (36%)	13 (20%)

Table 5 Comparing Group A and B (n=463).

Specifications	Group A (n=191)	Group B (n=272)	p value
CT AP	51 (27%)	130 (48%)	(p=<0.05)
CT Chest	90 (47%)	6 (2%)	(p=<0.05)
Surgical Intervention	40 (21%)	69 (25%)	(p=0.69)
Conservative Management	151 (80%)	203 (74%)	(p=0.69)
Deceased	15 (8%)	x	x
ITU Admission	6 (3%)	x	x
Re-admission rate	54(28%)	x	x
NB: In group A CT chest were obtained through CT CAP for all the 90 patients			

Table 6 Comparing Group A and B CT Chest.

Specifications	Group A CT Chest (n=90)	Group B CT Chest (n=6)
Positive findings of Covid19 on CT	5 out of 6 positive swap results	X
Positive finding of pneumonia	One patient	None

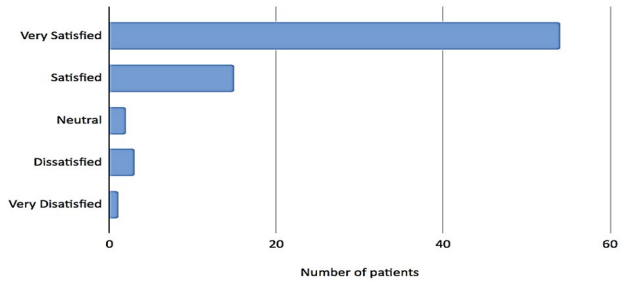

Figure 3 A graph to illustrate patients' satisfaction in Group A (n=75).

Table 7 Snapshot of Group A and B conservative management (n=354).

Specifications	Group A N=54	Group b N= 61
Appendicitis	5	12
Abscess	1	3
Hernia	5	3
PR bleed	7	16
Bowel Obstruction	13	15
pancreatitis	23	12

Discussion

This study prospectively assessed the impact of the COVID-19 pandemic on general surgical admissions in a large UK tertiary centre. At present, there is limited research detailing the incidence, prevalence, and impact of COVID-19 with regard to UK emergency general surgical admissions. However, a large international study was conducted between January and March 2020, focusing on 30-day mortality in patients diagnosed with COVID-19 who underwent elective or emergency surgery [16,17]. The study revealed a higher overall mortality rate (23.8%) in those undergoing surgery, which was highest in emergency patients (25.6%). The study concluded that although data on longer-term and more patient-centred outcomes was still needed, the threshold for surgical intervention should be higher during the COVID pandemic than during normal practice. Indeed, the increased surgical mortality during COVID has conferred a reduction in surgical interventions in some countries. Notably, Gallego et al. observed an overall decline in the rate of surgical interventions in Spain during March 2020, with all 3 COVID-positive patients who underwent urgent surgery dying of respiratory failure [16]. Patriti et al. also observed a significant drop in the number of urgent interventions in Italy during March 2020 [18].

However, conflicting research suggests that these emerging recommendations in surgical policy may warrant adjustment according to geographical COVID-19 burden. For example, a UK study by Seretis et al. concluded that emergency surgery should not be delayed in favor of non-operative management, given that only 3 of the 100 patients in their study became infected with SARS-CoV-2 over a 3 month period, pertaining no unplanned ICU admissions for respiratory support and no COVID-related mortality post-surgical intervention [19]. Similar to Seretis et al., our patient cohort demonstrated a relatively low mortality rate, with only 6 patients (3%) admitted to ITU for ventilator support.

Interestingly, Patriti et al. [18] observed no significant change in the surgical approach to COVID-19 patients, with a marked proportion

of COVID-19 patients continuing to undergo laparoscopic procedures. This raises the question of whether any perceived decline in surgical inventions may have been confounded by reduced surgical presentations, rather than organic changes in surgical decision-making regarding COVID-19 risk. Amongst our patient cohorts, however, there was no difference in the number of emergency surgeries performed during the COVID period compared to Group B period, suggesting that the uncertainties surrounding COVID diagnoses in acute admissions did not overall affect decisions to operate in emergency cases. Unlike other studies, we found no difference in emergency surgical intervention rate during the COVID period.

Most significantly, we observed that a significantly higher number of patients were subjected to additional radiation due to reduced thresholds for CT chest imaging in the COVID period. This is in agreement with recommendations from the Intercollegiate General Surgery Guidance on COVID-19 released, stating that patients presenting with acute abdominal emergencies, who are already having an abdominal CT in their diagnostic investigations, should have additional preoperative low-dose CT of the chest [20]. As only 4.4% (4/90) of CT chests performed on our surgical take patients were positive for COVID findings, it could be argued that most of these scans subjected patients to unnecessary radiation. However, many of the patients who had COVID-positive CT findings did not test positive on swab test, and vice versa, highlighting the difficulty in obtaining a confirmed diagnosis to inform surgical decision-making.

Conclusion

Finally, our study observed a 92% post-admission satisfaction rate over the COVID-period. To our knowledge, this study is unique in this outcome, with no other studies having commented on patient satisfaction over the course of the COVID-19 period. Patient satisfaction must remain an important consideration amidst this pandemic, especially when major disruptions to services will likely affect patients' expectations and confidence in hospital care. Safe and high-quality patient care has continued to be our priority, as reflected in the high number of satisfied responders.

Due to limitations in data collection as the trust is switching to a computerized archive to all patients files, we were unable to ascertain data for Group B such as 30-day mortality, readmission rate and raw ITU admission data. Therefore, we have been unable to draw conclusions regarding differences in pre-COVID and COVID mortality, readmission and the number of patients requiring ITU input between Group A and B. We must continue to deliver high quality surgical care throughout the COVID-19 pandemic, while utilizing the diagnostic capability of CT scans for quick surgical decision-making. This observational study demonstrates that our unit continued to deliver high quality surgical care to all the admitted patients during the peak of COVID-19 pandemic, with majority of our patients reported satisfied.

Conflicts of interest

The authors declare no conflicts of interest.

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