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Should Local Rather than National Policy Determine our Approach to Surgery During SARS- CoV-2?

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ABSTRACT

Purpose: A major disruption of routine hospital services has occurred globally after SARS-CoV-2 pandemic. Current publications are based on large databases collected from hospitals with different characteristics which may not apply to all centres since the impact of SARS-CoV-2 varies depending on the incidence in each area. We studied the incidence of perioperative SARS-CoV-2 infection in surgical patients.

Methods: We performed an observational, retrospective cohort study in patients undergoing surgery between March 16th to May 15th 2020.

Results: Four patients (5.4%) tested positive with SARS-CoV-2, all positive results were obtained postoperatively. SARS-CoV-2 status was known at the time of surgery in 23 (60%) patients in emergency surgery and 20 patients (57%) in elective surgery. Mortality rate was 13% in emergency surgery with no cases due to SARS-CoV-2 related complications. Nine patients (25.7%) had changes in their management in elective surgery, no deaths were reported and one patient developed SARS-CoV-2 bilateral pneumonia.

Discussion: Our results show that SARS-CoV-2 infection among surgical patients was low in our centre. Changes in policies on surgical activity during the SARS-CoV-2 pandemic should be taken at a regional or hospital level to reflect the local burden of SARS-CoV-2 and availability of resources.

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Introduction

A major disruption of routine hospital services occurred globally after SARS-CoV-2 was declared a pandemic by the World Health Organisation (WHO) on March 11th 2020 [1,2]. Guidelines based on expert opinion were published for the management of surgical patients during the SARS-CoV-2 pandemic [3-5]. During the SARS-CoV-2 outbreak, it was recommended to postpone non-critical procedures and promote nonoperative treatment to delay or avoid the need for surgery [6,7]. Surgical activity was restricted to procedures that could not be delayed unless the estimated survival of the patient was less than 3 months, cases were prolonged chemotherapy was not possible or cases that did not require prolonged ICU stay [3]. It is unclear, however, whether blanket adoption of SARS-CoV-2 guidelines based on analysis of data derived from large national and international databases including numerous hospitals, each with their differing patient population, resources, capabilities and disease prevalence should be applied wholesale at a local level to centres whose baseline characteristics are distinct from the overall cohort.

We hypothesise that despite a national or regional pandemic, in areas of low prevalence of SARS-CoV-2 infection, elective and emergency surgery can continue safely. We performed a descriptive study of the incidence of SARS-CoV-2 infection in patients operated on a General Surgery Department in a low prevalence area and subsequently discuss whether nationally/regionally imposed restrictions on surgical practice (including delaying/cancelling surgery and/or other procedures) should be decided at a more local level.

Material and Methods

Study Design

We performed an observational, retrospective cohort study in patients undergoing surgery between March 16th to May 15th 2020 during the peak of SARS-CoV-2 infection outbreak in Spain. Analysis was performed on June 15th 2020. Our centre was a designated "Hot Spot SARS-CoV-2 Hospital" by local health authorities, meaning that was one of the only two centres receiving SARS-CoV-2 patients of the province.

Participants
All adult patients undergoing surgery in the General and Digestive Surgery Department from March 16th to May 15th 2020 were screened against inclusion and exclusion criteria.

Inclusion criteria
Patients undergoing both elective and emergency surgery during the study period.

In patients undergoing multiple operations, the procedure closest to the time of confirmation of SARS-CoV-2 infection was defined as the index procedure.

Diagnosis of SARS-CoV-2
Diagnosis of SARS-CoV2 infection was based on viral RNA detection by quantitative real-time transcription-polymerase chain reaction assay (RT-PCR). Peri-operative sampling was predominantly based on nasopharyngeal swabs performed according to a standard protocol.

From April 13th 2020, a policy was implemented that all emergency cases (where the clinical presentation allowed) should be screened for SARS-CoV-2 using an RT-PCR test based on a nasopharyngeal swab prior to a decision about surgery being made. From that date, all elective cases underwent RT-PCR screening 48 hours prior to surgery. Prior to that date, perioperative RT-PCR screening would only be performed in symptomatic patients or contacts of SARS-CoV-2 infected patients. A specific theatre was designated for confirmed SARS-CoV-2 positive or unscreened emergency patients.

Outcomes
The primary outcome was incidence of SARS-CoV-2 in surgical patients. Secondary outcomes were timing of SARS-CoV-2 test and knowledge of SARS-CoV-2 infectious status during surgery, disease nature, changes in surgical management, complications (defined by Clavien-Dindo classification [8,9]), 30-day mortality and Intensive Care Unit (ICU) admission.

Results
74 patients were included in the study. All had 30-day follow up at the time of analysis. Post-operatively, RT-PCR was only performed on the basis of symptoms. 39 patients (52.7%) underwent emergency surgery and 35 patients (47.3%) elective surgery (Table 1). 4/74 (5.4%) patients tested positive for SARS-CoV-2: 2/39 (5.1%) in the emergency surgery group and 2/35 (5.7%) in the elective surgery group (Table 2). There were no preoperative positive RT-PCR and the four cases were diagnosed postoperatively.

Table 1: Description of elective and urgent procedures

Elective procedures n= 35	
Malignant 31 (88.5%)	
Lymph node biopsy	2
Whipple procedure	4
Thyroidectomy	2
Atypical liver resection	3
Hemicolectomy	5
Sigmoidectomy	3
Anterior resection	4
TEO	2
Gastrectomy	3
Staging laparoscopy-gastric cancer	1
Laparotomy- unresectable	2
Benign 4 (11.5%)	
Cholecystectomy	1
Removal of dialysis catheter	1
Anal dilatation	1
Colostomy reversal	1

Urgent procedures n= 39	
Benign 38 (97.4%)	
Abscess debridement	5
Appendectomy	12
Hartmann	4
Adhesiolysis	2
Hernioplasty	4
Cholecystectomy	2
Small bowel resection	1
Hemicolectomy	3
Gastrectomy (gastric perforation)	1
Damage control laparotomy	4
Malignant 1 (2.6%)	
Colostomy (carcinomatosis)	1

TEO: Transanal resection operation

Table 2: Characteristics of Covid-19 patients

ASA	Diagnosis	Timing of RT-PCR	Scheduled RT-PCR	SARS CoV-2 status	Type of surgery	Date of surgery	Procedure	Designated theatre	Changes in management	Complicacions C-D	Respiratory complicacions	Treatment requiered	Cause of death	LOS	Readmission
1	Pancreatic cancer	After surgery	No	No	Elective	26/03/2020	Whipple	No	ERCP	2	No	Isolation	NA	11	No
1	Gastric cancer	After surgery	No	No	Elective	02/04/2020	Parcial gastrectomy	No	No	No	Bilateral pneumonia	Conservative meassures	NA	7	Yes
4	Intestinal isquemia	After surgery	NA	No	Urgent	07/04/2020	Hartmann	No	No	5	No	ICU	Intestinal ischaemia	NA	NA
1	Perianal abscess	After surgery	NA	No	Urgent	08/04/2020	Abscess debridement	No	No	No	No	Isolation	NA	1	No

SARS CoV-2 status: SARS CoV-2 status was known at the time of the surgery; ICU: Intensive care unit, C-D: Clavien Dindo classification, LOS: length of stay; ERCP: Endoscopic retrograde cholangiopancreatography, NA: not applicable

Emergency Cases

SARS-CoV-2 status was known at the time of the surgery in 23/39 (60%) patients. Two patients were diagnosed postoperatively with SARS-CoV-2 prior to routine pre-operative screening (April 13th). After April 13th, 2 patients required a lifesaving non-delayable procedure and surgery was performed without results, which were negative. Two patients tested positive for SARS-CoV-2 in this group, both were operated before April 13th 2020 and were only tested during the postoperative course due to close contact with a patient that tested positive. Nine patients (23%) developed postoperative complications grade ≥3 within 30-days; none of them respiratory. 30-day mortality rate was 13% although none of the deaths was related to SARS-CoV-2 complications. Nine (23%) patients required ICU admission.

Elective Cases

SARS-CoV-2 status was known at the time of the surgery in 20/35 (57%) patients and all tested negative. 15 patients (all of whom were asymptomatic patient and did not have any known SARS-CoV-2 infected contacts) underwent elective surgery prior to the introduction of our policy for universal screening. The remaining 20/35 (57%) all tested negative for SARS-CoV-2 prior to surgery. Most cases were malignant (88.5%) and all benign cases (11.5%) were operated in the last two weeks of the study period (1st -15th May). 9/35 (25.7%) had changes in their management (Table 3). Three patients (8.5%) presented complications grade ≥3. Two patients tested positive for SARS-CoV-2 in this group, both were operated before the universal elective testing policy that started on 13th April 2020 and testing was driven in both cases by symptomatology post-operatively. The patient with pancreatic cancer presented with fever (but no overt respiratory symptoms) after being discharged. RT-PCR was positive, and no other causes for high temperatures were identified and required no treatment. The patient with gastric cancer presented to the emergency department with respiratory symptoms and was diagnosed with SARS-CoV-2 bilateral pneumonia (confirmed by RT-PCR). Both patients were managed conservatively and required no specific intervention. There were no deaths in this group. One patient (2.8%) required ICU admission after postoperative haemorrhage.

Table 3: Characteristics of patients who had changes in their management

ASA	Diagnosis	Timing of RT-PCR	Scheduled RT-PCR	SARS CoV-2 status	Type of surgery	Date of surgery	Procedure	Designated theatre	Changes in management	Complicacions C-D	Respiratory complicacions	Treatment requiered	Cause of death	LOS	Readmission
1	Pancreatic cancer	After surgery	No	No	Elective	26/03/2020	Whipple	No	ERCP	2	No	Isolation	NA	11	No
1	Gastric cancer	After surgery	No	No	Elective	02/04/2020	Parcial gastrectomy	No	No	No	Bilateral pneumonia	Conservative meassures	NA	7	Yes
4	Intestinal isquemia	After surgery	NA	No	Urgent	07/04/2020	Hartmann	No	No	5	No	ICU	Intestinal ischaemia	NA	NA
1	Perianal abscess	After surgery	NA	No	Urgent	08/04/2020	Abscess debridement	No	No	No	No	Isolation	NA	1	No

SARS CoV-2 status: SARS CoV-2 status was known at the time of the surgery; ICU: Intensive care unit, C-D: Clavien Dindo classification, LOS: length of stay; ERCP: Endoscopic retrograde cholangiopancreatography, NA: not applicable

Discussion

After March 16th 2020, our department significantly changed practice in response to the SARS-CoV-2 pandemic with reduced elective surgical lists, telephone consultations and ringfenced working practices. Surgical activity was adapted daily depending on the availability of ICU and other hospital beds. This reorganisation differed from hospitals in higher prevalence areas where elective cases were completely cancelled due to pressures for hospital and ICU beds with most surgical staff being redeployed to assist with direct care of SARS-CoV-2 patients.

During the SARS-CoV-2 outbreak, it was recommended to postpone non-critical procedures and promote nonoperative treatment to delay or avoid the need for surgery [10]. In a study performed by the collaborative group COVIDSurg, that consisted in an international, multicentre, cohort study at 235 hospitals in 24 countries including all patients undergoing surgery who had SARS-CoV-2 infection confirmed within 7 days before or 30 days after surgery, the overall 30-day mortality was 23.8%, pulmonary complications occurred in 51.2% of patients and 30-day mortality in these patients was 38% [11]. Similar results have been observed in a single centre study in a highly prevalent area that reported three cases of SARS-CoV-2 among 36 patients

having emergency operations resulting in all three deaths due to respiratory failure [12].

We analysed the incidence of SARS-CoV-2 perioperative infection in patients undergoing surgery in a low prevalence area in a referral hospital covering a population of 800,000 inhabitants. Our centre was designated a "Hot Spot SARS-CoV-2 Hospital" since we serve the region as a tertiary referral centre. This designation was imposed on us and reflected the burden of disease across the region we serve as a whole rather than in our local population. Thus, despite being a designated "Hot Spot SARS-CoV-2 Hospital", we were able to maintain more elective surgical services in our centre than other hospitals, probably on account of the number of cases as reported by national authorities the number of newly diagnosed cases on March 16th was 62 for our province, 1,421 for the near province with the highest incidence, 1,839 for the county and 9,462 for the country [13]. Those factors may have contributed to a later arrival of the peak of cases, due to that fact preventive measures could be established in advance, such as increasing the number of Intensive Care Unit (ICU) beds thus cancellation rate of elective surgery was lower and fewer restrictions were applied when admitting cases to ICU.

Our results show that SARS-CoV-2 among surgical patients was low, 5% in emergency group and 5.7% in elective group. Mortality rate was 13% in emergency group with no deaths due to SARS-CoV-2 related respiratory complications. The decision to perform Emergency Surgery in patients diagnosed with SARS-CoV-2 has to be balanced between the mortality and morbidity of the underlying surgical pathology, the efficacy of any conservative/medical non-operative options and the post-operative mortality. SARS-CoV-2 positive patients have been described to be associated with a greater 30-day postoperative (greater risk of pulmonary complications, OR 35.6 and thromboembolic complications, OR 13.2) [14] an overall mortality rate from 16%-23.8% [11,15] and a 3.4-fold increased overall mortality risk compared with matched control patients with a negative SARS-CoV-2 status [15].

No deaths were reported in the elective group. There was one case of SARS-CoV-2 pneumonia in this series. This patient was readmitted with respiratory symptoms after a partial gastrectomy and RT-PCR confirmed the diagnosis. SARS-CoV-2 status was unknown at the time of surgery and diagnosed postoperatively, as such no changes in the surgical management were required. The patient required no specific treatment for SARS-CoV-2 and was discharged home after 7 days.

Here we demonstrate that in an area of low prevalence (where screening is available), surgical activity can safely continue. While regrettably by November 2020, SARS-CoV-2 infection has directly caused 1,231,017 deaths worldwide [16], we also have a duty of care to ensure that there is not a significant number of preventable deaths in patients who otherwise had survivable disease who have poor outcomes (such as disease progression and complications due to procedures performed in order to delay the surgery for instance ERCP or prolonged chemotheraphy [17-19]. due to cancelled or delayed operations or screening tests [20,21].

This has been previously reported in depth in various publications mentioning dreadful consequences and the long-term effects of generalised cancellation and delays. For instance, there is indirect evidence that suggests an increase in morbidity, disease progression and mortality related to cancer due to the pandemic situation [22,23] as well as for acute coronary syndromes, where studies suggest that the total ischemia time was significantly longer in the SARS CoV-2 period [24], since patients experiencing symptoms compatible with acute myocardial infarction were not attending hospitals due to fear of getting infected added to the reduction in scheduled procedures such as percutaneous coronary interventions due to the unavoidable reorganization of hospitals and more complicated patient flow. This could have triggered increases in mortality and long-term complications of myocardial infarction and missed opportunities to offer secondary prevention treatment for patients with coronary heart disease [25,26]. Those studies show the impact not only on resources and massive economical cost but also in terms of surgical outcomes, disease free and overall survival without forgetting about the emotional toll along with the anxiety and apprehension over the safety of returning to medical facilities [17-19].

Going forward it is important that we learn these lessons, so that we serve as many of our entire patient population as possible in a scientific and reasoned fashion. While undoubtedly doctors and other healthcare professionals will continue to have to work flexibly as SARS-CoV-2 prevalence ebbs and flows within our local population, there does need to be greater flexibility in the implementation of national policies such that we minimise the unnecessary cancellation/ reduction in elective life-saving surgical activity and more broadly disease screening as is done regularly during seasonal outbreaks of other infectious diseases such as influenza that impact care annually. We did this by a daily review of hospital and ICU occupancy and moderated activity accordingly.

Conclusion

The difficult decisions about providing optimal care for all of population is likely to be an on-going issue until a reliable vaccine can be deployed at scale and while we are already seeing evidence of a more localised flexible curfew measures being deployed by governments across the world in response to localised/ regional "second" spikes of SARS-CoV-2, local hospitals or healthcare authorities need to be given the authority to put their patients at the centre of the decision-making and moderate their activity more dynamically. The design of this study could not provide a definitive recommendation although the results support that surgical procedures could continue to be performed when the situation of the hospital allows it.

Declarations

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