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COVID-19 AND ACUTE ABDOMEN: A CASE EXPERIENCE REPORT

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Abstract: The ongoing outbreak of coronavirus disease 2019 (COVID-2019) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been declared a pandemic by the World Health Organization and has imposed a great burden on global medical systems. During the COVID-19 outbreak, some patients with COVID-19 pneumonia also suffered from an acute abdomen, requiring surgical treatment; however, there is no consensus for the treatment of these patients. Non-systematic literature review study carried out until October 28, 2021. The terms were searched: "COVID" OR "COVID-19" OR "Coronavirus" OR "SARS-CoV-2" AND "acute abdomen" in following databases: Pubmed and Google Scholar. Articles originally published in English were considered eligible. Articles published in 2020 and late 2019 with a focus on elucidating the relationship of COVID-19 with acute abdomen were included. Patients with acute abdomen require emergency surgery. SARS-CoV-2 infection can affect several organ systems, including the digestive tract. Little is known about the consequences of COVID-19 infection in emergency surgical patients. Mild co-infection with COVID-19 did not result in further complications for emergency abdominal surgery. However, an acute abdomen during severe COVID-19 infection was part of a poor prognosis.
Keywords: COVID-19, acute abdomen, emergency surgery, Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), Laparoscopy, Abdominal surgery.

INTRODUCTION

In the last two decades, there have been two large-scale pandemics caused by coronaviruses, severe acute respiratory syndrome (SARS) (ZHONG et al. 2013) and Middle East respiratory syndrome (MERS) (ZAKI et al. 2012). In late 2019, another new coronavirus, called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged in Wuhan and subsequently spread rapidly throughout the world (HUANG et al. 2020; WANG et al. 2020). Due to the accumulation of evidence of continued person-to-person transmission and an overall susceptibility of humans to the virus (CHAN et al. 2020; XIAO et al. 2020), the World Health Organization (WHO) has declared coronavirus disease 2019 (COVID- 19) a public health emergency of international concern on January 30, 2020. As of November 21, 2021, COVID-19 caused more than 5 million deaths among more than 250 million infected patients. Although SARS-CoV-2 has been found to predominantly infect the lower airways and cause life-threatening pneumonia (TIAN et al. 2020; YAO et al. 2020), evidence has revealed that the digestive system may be another viral target potential (XIAO et al. 2020; LIANG et al. 2020; SONG et al. 2020).

Although most elective surgeries have been delayed in endemic areas, patients with potentially fatal acute abdomen still require urgent surgical interventions (eg, those with gastrointestinal perforation or acute purulent appendicitis) while relevant evidence is sparse. The diagnosis of COVID-19 is based on clinical manifestations, epidemiological history, computed tomography (CT) findings of the chest, and reverse transcription polymerase chain reaction (RT-PCR) test for SARS-CoV-2. However, the scarcity of RT-PCR test kits and the prolonged detection time limit their application in emergency circumstances.

Acute abdomen is defined as the acute onset of abdominal pain that requires accurate diagnosis and treatment within a certain time limit to prevent mortality and morbidity (MAYUMI et al. 2016). During outbreaks of COVID-19, some patients with COVID-19 pneumonia also suffered from an acute

abdomen, requiring immediate intervention (GAO et al. 2020). However, previous studies have shown that preoperative pneumonia is a significant risk factor for poor post-surgical outcomes (JAMALI et al. 2018; PATTERSON et al. 2020). Furthermore, surgical treatment can increase the exposure of the medical staff to SARS-CoV-2 (COCCOLINI et al. 2020, AMINIAN et al. 2020) and trigger excessive inflammation in the patient, resulting in the worsening of COVID-19 pneumonia (MI et al. al. 2020). Therefore, an investigation of the impact of emergency surgery on patients with acute abdomen and COVID-19 pneumonia is urgently needed.

MATERIAL AND METHOD

Non-systematic literature review study carried out until October 28, 2021. The terms were searched: "COVID" OR "COVID-19" OR "Coronavirus" OR "SARS-CoV-2" AND "acute abdomen" in following databases: Pubmed and Google Scholar. Articles originally published in English were considered eligible. Articles published in 2020 and late 2019 with a focus on elucidating the relationship of COVID-19 with acute abdomen were included.

Alternatively, other studies selected jointly by the authors to reference additional review data were included. These studies, in turn, were not necessarily listed in previously consulted databases and publication dates prior to 2019 were considered suitable.

ACUTE ABDOMEN AND COVID-19

Patients with acute abdomen require emergency abdominal surgery, including concomitant infection with COVID-19 (COVIDSURG et al. 2020; GAO et al. 2020). The consequences of COVID-19 infection in patients undergoing emergency surgery are still poorly understood (GAO et al. 2020). In severely affected patients with COVID-19, the incidence of gastrointestinal complications is high (73.8%), including the occurrence of gastrointestinal ischemia (3.8%) (KAAFARANI et al. 2020). The factors responsible for this digestive involvement are not clearly defined. The pathophysiological hypotheses include pharmacological side effects, microvascular thrombotic events and viral enteroneuropathy (KAAFARANI et al. 2020). Common gastrointestinal symptoms include nausea, vomiting, abdominal pain and diarrhea (PATEL et al. 2020). Based on surgical treatment of an acute abdomen as indicated independently of a concomitant SARS-CoV-2 infection, the objective of this consecutive prospective series was to assess the underlying pathology and postoperative clinical course of COVID-infected emergency surgical patients. 19. Our hypotheses were that patients co-infected with SARS-CoV-2 with acute abdomen on admission had a more favorable outcome than patients with acute abdomen during hospitalization for severe COVID-19 disease, and that an acute abdomen during COVID- 19 may simply coincide with SARS-CoV-2 infection.

Coronaviruses commonly cause respiratory and/or enteric infections (SIRINARUMITR et al. 1996; PERLMAN et al. 2009). The characteristic symptoms of COVID-19 are acute lower respiratory diseases. However, the involvement of the digestive system is increasingly being studied. In a systematic review with meta-analysis of over 6,000 patients, the pooled prevalence of digestive symptoms and digestive comorbidities was 15% and 4%, respectively. Higher rates of gastrointestinal symptoms have been found in severe COVID-19 infections, and their unique presentation (about 10% of patients) resulted in late diagnosis (MAO et al. 2020). The new onset of gastrointestinal symptoms was predictive of a severe course of the disease (MAO et al. 2020). Consistent with the greater sensitivity of chest CT compared to RT-PCR

(AI et al. 2020), CT revealed COVID-19 disease in patients with negative RT-PCR.

SURGICAL PROCEDURES AND RESULTS

The following perspectives and precautions regarding clinical management and surgical procedures are based on the experience of case reports and on the treatment and operation of these patients with suspected COVID-19 and acute abdomen.

Indications for emergency surgery during the COVID-19 pandemic are considered the same as before in regular patients. There are difficulties in decision making regarding surgery for patients with suspected COVID-19 and in the differential diagnosis of COVID-19 with other types of pneumonia before surgery. However, the main concern is to balance the timely treatment of these urgent cases with the protection of all medical personnel. Therefore, if COVID-19 infection cannot be completely ruled out, the highest level of protection must be adopted.

Before scheduling emergency surgery for patients with suspected or confirmed COVID-19, hospitals must designate negative pressure operating rooms away from high traffic areas, preferably isolated from the main operating rooms. We also recommend developing specific transfer routes and isolated recovery rooms, ICUs or medical wards in advance. Even in potentially contaminated areas, patients with suspected or confirmed COVID-19 must be placed in separate rooms to reduce the risk of intra-hospital transmission. In addition, infected patients need to be treated by a dedicated medical team consisting of doctors, nurses and other healthcare professionals, who avoid traveling throughout the hospital.

The exfoliation team performing emergency surgery on such patients must be equipped with full PPE as described above. The number of surgical, nursing and anesthesiologist team members working in operating rooms must be limited to the minimum necessary to perform the surgery.

During surgery, the use of electrocautery or ultrasonic scalpels must be limited (or energy settings lowered) as much as possible to reduce the risk of aerosolized viral spread, especially when protective equipment has been insufficient. In all 4 of the present cases, exploratory laparotomy was chosen over laparoscopic procedures because of the manageable operating time and the uncertainty of the risk of air and aerosol transmission. And we suggest that surgeons planning to perform minimally invasive procedures need to pay more attention to the establishment and removal of artificial pneumoperitoneum, and also to any air leakage from the trocar sites (ZHENG et al. 2020).

Wearing full PPE can be quite uncomfortable and surgery under these conditions can be more challenging and technically demanding than usual. Even experienced surgeons need to be wary of disturbances caused by the fog that forms on glasses and visors. The surgical nurse can help alleviate this distraction by clearing the fog.

Compared to regular patients, patients with suspected or confirmed COVID-19 need more frequent postoperative follow-up checks and comorbidities need to be treated more actively as the mortality rate for patients with COVID-19 with multiple comorbidities is greater than for those without comorbidities (ZHOU et al. 2020).

DISCUSSION

Accurate diagnosis and appropriate intervention within a given time limit are crucial to prevent deterioration and mortality in patients with acute abdomen (MAYUMI et al. 2016). Although previous studies have shown that preoperative pneumonia

is significantly associated with worse postoperative outcomes (JAMALI et al. 2018; PATTERSON et al. 2017), there is still no direct evidence suggesting that surgical treatment leads to adverse effects in patients with acute abdomen with pneumonia caused by COVID-19. It was noted that emergency surgery may not only improve the outcome of patients with COVID-19 pneumonia with an acute abdomen, but also benefit the resolution of pulmonary inflammation.

COVID-19 can complicate the perioperative course of the acute abdomen (GAO et al. 2020; BLANCO-COLINO et al. 2020). Most of the evidence revealed that SARS-CoV-2 RNA was identified in stool samples (XIAO et al. 2020; HOLSHUE et al. 2020) and that the viral angiotensin-converting enzyme 2 (ACE2) receptor was highly expressed in gastrointestinal epithelial cells (YAN et al. 2020; HARMER et al. 2002), this evidence supported the conclusion that the digestive system is a potential target of SARS-CoV-2. Furthermore, infection-related biomarkers (including peripheral blood lymphocytes and leukocytes) tend to decrease in patients with COVID-19 pneumonia (HUANG et al. 2020; WANG et al. 2020), whereas these indicators often increase in patients who present just acute abdomen. Blanco-Colino et al. also reported a case of suspected acute abdomen as an extrapulmonary manifestation of COVID-19 (BLANCO-COLINO et al. 2020). All these results demonstrate that COVID-19 probably interferes with the accurate diagnosis and clinical assessment of the acute abdomen.

To better perform emergency surgery during the flare-up, a detailed management strategy for patients with acute abdomen has been developed. For patients with stable vital signs and local involvement (such as isolated acute appendicitis, isolated acute cholecystitis, and incomplete ileus) who do not require emergency surgery, conservative treatment in the outpatient setting may be considered. If conservative treatment fails, emergency surgery must be performed immediately. The goal of emergency surgery is to remove the patient's injuries quickly and effectively, minimizing operating time and limiting exposure to the medical staff.

Indications for emergency surgery must be strictly administered during the COVID-19 outbreak. Possible reasons for opposing surgical interventions for acute abdomen accompanied by COVID-19 pneumonia are as follows: 1) Surgical interventions in patients with COVID-19 can lead to contamination of the operating room and surgical equipment and risk of transmission of the infection to healthcare professionals and other patients in the hospital (AMINIAN et al. 2020; TUECH et al. 2020) surgical treatment can trigger oxidative stress (NIBALI et al. 2015) and immunosuppression (KIM et al. 2018), which can trigger prevent the clearance of SARS-CoV-2 and accelerate the progression of COVID-19 pneumonia. However, the scientific basis for this theory is very weak. Jamali et al. reported that preoperative pneumonia only moderately increased the risk of mortality (OR = 1.2) in patients undergoing emergency surgery (JAMALI et al. 2018). Furthermore, an improvement in acute abdomen and pneumonia after surgery was observed in our study. One possible explanation for these results is that surgical treatment alleviated excessive inflammation and persistent immunosuppression caused by the acute abdomen, which in turn contributed to virus clearance and resolution of lung inflammation. In addition, medical staff can effectively prevent SARS-CoV-2 infection by adhering to strict infection prevention and control protocols (COCCOLINI et al. 2020; ADHIKARI et al. 2020).

Current clinical observations have found that the majority of patients with COVID-19

have fever and patients with an acute abdomen often have fever. Some postoperative patients may experience fever, which may result from postoperative traumatic stress or residual abdominal infection. This makes it extremely difficult to identify the cause of the fever and identify COVID-19 in a timely manner. Elderly patients, especially those with pulmonary infections, are more susceptible to COVID-19 during the period of postoperative hospitalization. Therefore, we closely monitored the patient's body temperature and routine blood parameters, including PCT and CRP, were regularly retested. If necessary, a chest CT scan was performed again to monitor the progression of COVID-19 pneumonia.

This study had some limitations that must be discussed. First, due to the lack of definitive practical guidance for patients with acute abdomen and COVID-19 pneumonia, the studies are isolated cases rather than being based on evidence from randomized clinical trials. Second, this was a small sample, non-randomized literature review study with no strict inclusion and exclusion criteria, and as such, there were potential biases that could affect the comparison analysis. Third, the availability of clinical care and the diversity of COVID-19 management may limit the applicability of the results.

FINAL CONSIDERATIONS

Contrary to the poor prognosis of gastrointestinal involvement with severe COVID-19 infection, clinical information and pathological findings could not associate any acute abdomen with SARS-CoV-2 infection in the present review of articles. Mild co-infection with COVID-19 did not appear to cause further complications for emergency abdominal surgery. However, an acute abdomen during severe COVID-19 infection was part of an unfavorable prognosis in the cases analyzed.

We will certainly see in the coming months the results of international cohort studies and clinical trials that will allow better protocols to be proposed based on scientific evidence. We adapted the protocols according to the experience described. In addition, it will be necessary to consider whether the current system in place in the emergency services of many hospitals is adequate. Appropriately trained multidisciplinary groups may also be needed for screening for potentially surgical pathologies. Finally, new challenges lie ahead, such as the transformation not only of traditional departments, but also of hospitals and our healthcare system.

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