

CHAPTER 7

EMERGENCY SURGICAL APPROACHES TO COVID-19 PATIENTS

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INTRODUCTION

By the end of December 2020, the corona virus outbreak that began in China in December 2019 had infected more than 66 million people and caused the death of more than 1,5 million. It has affected and continues to affect the whole world. Although individuals of all ages are at risk, the risk for severe disease is greater in people aged 60 and over, who have chronic medical conditions and live in nursing homes. Regardless of chronic conditions, the mortality rate is highest for those over the age of 70. Community-based inequalities, such as access to healthcare and personal protective equipment, contribute to higher rates of serious illness. However, if we want to be successful in the fight against a global outbreak, all communities or all local areas within the community should be reached and provided with equal health services, as far as possible. The disease can be asymptomatic or progress to pneumonia with severe respiratory distress that can cause death. The most usual symptoms are fever, cough and shortness of breath, while headache and muscle aches are also relatively common. According to recent publications, an impaired sense of smell and taste are also among the common symptoms. Although imaging most commonly reveals bilateral diffuse opacities on chest radiographs and bilateral

peripheral ground-glass opacities on thoracic computed tomography scans, imaging may be completely normal. Leukopenia and lymphopenia are the most common laboratory findings. Elevated liver function tests, D-dimer and C-reactive protein levels may be detected. The potential long-term Covid-19 complications are not clearly known yet. Remdesivir is the only drug approved by the FDA (Food and Drug Administration) for use in Covid-19. It is routinely recommended for patients who are hospitalized and receiving oxygen support. It is however not routinely recommended for patients on mechanical ventilation. Severe Covid-19 patients have a severe inflammatory response that leads to multiorgan failure. A severe cytokine storm causes this inflammation. Corticosteroids may be added to the Remdesivir therapy because of their anti-inflammatory effects to counteract cytokine storms.

Even though everyone around the world is exhausted by the battle against the Covid-19 pandemic, the fight continues and we do not know how long it will persist. The data are updated every day and all the algorithms can be changed, depending on new findings. We have examined the emergency surgical approach to Covid-19 patients using the available Covid-19 guidelines and data from other colleagues. One of our primary goals is to provide healthcare professionals and hospital facilities that will provide treatment for patients who do not have Covid-19 but who need emergency surgical treatment in hospitals. Consequently, in the management of the Covid-19 outbreak, it is very important to determine which patients admitted to hospitals and requiring surgery will undergo emergency operations and which operations can be postponed.

Due to the intensive workload, rates of depression and anxiety among healthcare personnel are increasing. Emergency surgical intervention is a field that requires serious attention but may also result in irreversible outcomes in the event of any trouble. Therefore, assessing and managing the physical and mental state of healthcare professionals, as well as the management of patients, is very important for success. In this respect, the distribution of hospital duties must involve a responsible person who observes healthcare personnel and when required, vulnerable staff should be relocated or provided with psychiatric support.

There are several guidelines on the management of emergency operations during an outbreak; however, these are mainly related to the most familiar situations. There will be diseases about which physicians have to decide in accordance with medical ethics and in different surgical situations, based on their medical knowledge and experience and by evaluating approaches to similar situations. Furthermore, when following the existing guidelines, to

make the correct decision the surgeon must be fully acquainted with the hospital facilities. Reliable information can then be given to the patient and the risks explained accordingly. Local organization and communication within the hospital is very important in this context.

EMERGENCY SURGICAL APPROACHES DURING THE COVID-19 OUTBREAK

Approaches to Patients in Emergency Departments during the Outbreak

In an environment of high hospital occupancy, non-emergency procedures should be postponed as they require personal protective equipment, increase the workload and decrease the efficiency of healthcare personnel, and increase the unnecessary risk of infection. There will, likewise, be a greater need for ventilator support, due to the increase in pandemic cases. To meet this need, a better approach would be to only perform emergency operations. About half of Covid-19 patients develop postoperative pulmonary complications and are associated with high mortality rates. This association is greater especially in male patients over 70 years of age. In this respect, operations on patients with confirmed or strongly suspected Covid-19 should be delayed as much as possible. The literature involves studies indicating that emergency surgery should be delayed when indicated or can be performed safely in pandemic hospitals. Since the emergence of Covid-19, each country will evaluate its own experiences and find better solutions to the problems that arise. Thus, although the guidelines to be followed have been published, the information is likely to change in the future.

Trauma is a condition for which emergency surgical treatment does not vary a great deal during an epidemic. However, during the pandemic many countries have observed a reduction in the overall number of patients presenting to the emergency department and the number of trauma patients. This is believed to result from the non-referral of people to hospitals due to the fear of infection, despite pandemic-related restrictions and the emergency situations. Although there is generally no difference in mortality rates by the number of inpatients, the low number of referrals to hospitals and mortality rates can be compared unambiguously only by investigating the long-term effects.

Acute hemorrhoidal disease is usually resolved with local anesthesia without surgery on an outpatient basis, while cases with massive bleeding, necrosis and non-responsive to treatment require emergency surgery.

Perianal or perirectal abscess can be treated by drainage under local anesthesia. If the operating room is not available, percutaneous drainage can be performed as an alternative and temporarily. However, care should be taken at this point since inadequate drainage will prolong the hospital stay.

Soft tissue abscesses can be treated on an outpatient basis with drainage under local anesthesia. However, the inadequate drainage of abscesses that are large or extending into muscles may prolong the hospital stay. Thus, treatment should be performed under operating room conditions. Necrotizing infections are conditions that require debridement with an emergency intervention.

If necrotizing acute pancreatitis is infected, appropriate antibiotherapy should be initiated immediately. In cases requiring drainage, percutaneous or endoscopic drainage should be performed first in eligible patients, and laparoscopic or open surgical drainage in failed or non-eligible patients.

Acute appendicitis is the most common condition requiring emergency surgery. Despite the presence of non-surgical follow-up in the literature, the gold standard treatment for these patients is laparoscopic appendectomy. During an outbreak, non-operative antibiotherapy is recommended for eligible patients in line with hospital resources. Due to the increased perioperative pulmonary complications and mortality rates, antibiotherapy is recommended primarily and especially if appropriate in patients with confirmed or strongly suspected Covid-19. If patients are to be surgically treated, then open appendectomy is recommended due to the risk of aerosol transmission. Previous studies have suggested that a very small proportion of patients treated without surgery require surgery, and that non-surgical acute appendicitis treatment can be used more widely in the future without any association with an outbreak. However, prospective analyses with far more data may be more useful. Delays in referral to hospital increase the number of complications that require long-term treatment, such as perforation and periappendicular abscess, in patients with acute appendicitis. Complicated acute appendicitis patients with localized perforation and abscess can be followed up with percutaneous drainage if there are no signs of diffuse peritoneal irritation. During the Covid-19 outbreak, the situation that is and will continue to be a big problem for people is the fear of being infected with Covid-19. Despite having serious symptoms, many people delay their referral or do not refer to emergency clinics. There are publications supporting a similar delay in acute appendicitis.

Conditions with signs of diffuse peritoneal irritation, for reasons such as perforation, bowel obstruction, closed loop obstruction, and intestinal isch-

emia, require emergency surgery. If intestinal obstructions are due to adhesions and there are no examination findings of acute abdomen, patients should be followed up with nasogastric drainage and supportive treatment.

Acute cholecystitis is one of the common conditions seen in the emergency department. Laparoscopic cholecystectomy should be performed on patients with acute cholecystitis who are not at high surgical risk, if deemed appropriate having evaluated the hospital resources. If the operating room and hospital resources are not available, or the patient is at high risk for surgery, intravenous antibiotherapy should be administered. When patients with cholelithiasis or chronic cholecystitis present with pain, symptomatic treatment should be provided, and the operation should be postponed if possible. If there are repeated referrals to hospital and there are available hospital resources, the operation may be recommended. Percutaneous cholecystostomy should be performed on complicated patients who do not respond to antibiotherapy, who are at high risk and who have a delayed referral.

For patients with choledocholithiasis, if the stone is large and there are signs of cholangitis, ERCP (Endoscopic Retrograde Cholangiopancreatography) should be performed, and if necessary, elective cholecystectomy should be performed in the late period. Patients with small stones without symptoms and cholangitis can be followed up for a while. Broad-spectrum antibiotherapy should be attempted first in patients with cholangitis. ERCP and sphincterotomy should be performed on non-responsive patients. Due to the high risk for aerosol transmission in ERCP, it should be performed by taking necessary precautions and in line with hospital resources.

Patient selection is very important in diverticulitis patients. Hinchey class 1 and 2 patients should be treated with intravenous or outpatient antibiotherapy and percutaneous drainage should be performed on patients when necessary. If treatment fails, surgery is performed immediately. Purulent or fecal peritonitis patients with diffuse intra-abdominal free air should be operated on immediately.

Colorectal cancer patients may present to the emergency department for reasons such as obstruction, perforation, and bleeding. Cancer patients are more vulnerable to infections due to chemotherapy, radiotherapy and surgery, as well as due to the disease itself. In addition, complication rates have increased in cancer patients with Covid-19 and the need for intensive care units has also increased. In conclusion, cancer patients have a poorer prognosis when infected with Covid-19 compared to those without cancer. Therefore, elective surgeries of stable cancer patients should be postponed, and if these patients

are to undergo surgery, they should be followed-up more closely and carefully. If there are available hospital resources and the ventilator availability in the intensive care unit is high, then obstructive colorectal tumors, colorectal tumors requiring frequent and massive blood transfusions and cancers causing perforation and sepsis are cases that should be operated on immediately, depending on the prevalence of Covid-19 cases. Rectal cancers that do not respond to neoadjuvant radiochemotherapy and early rectal cancers should also be operated on electively and without delay. If there are too many Covid-19 patients in the hospital and there is a reduced number of unused ventilators in the intensive care unit, stenting should initially be attempted in eligible patients, among those with obstructive gastroesophageal junction and colon tumors without signs of peritoneal irritation, and patients for which this failed should undergo surgery. In addition, hospitalized patients with bleeding, as well as cancer patients with perforation and sepsis, should be operated on immediately. Other patients can be transferred to alternative hospitals with a low occupancy rate. When hospitals are wholly reserved for Covid-19 patients and the intensive care units and ventilators are fully occupied, emergency operations are performed on patients who may die within hours if the operation is postponed. These are obstructive patients with perforation and sepsis or patients with massive bleeding. Other patients should be transferred to other available hospitals. A temporary stoma can be administered to eligible patients.

Emergency drainage is required for patients with breast abscess and hematoma presenting to the emergency department. If ischemia develops in mastectomy flaps, the revision should be performed immediately. However, if the hospital has reserved all its facilities for Covid-19, reconstruction operations should be postponed.

Patients with confirmed or strongly suspected Covid-19 should be followed-up by avoiding surgery as much as possible, considering the issues we have mentioned. Patients who are designated for surgery should be operated on as soon as possible and should remain in hospital for the shortest possible time. For patients who are followed-up without surgery, an operation should be reconsidered if there is no success and the hospital stay will be prolonged.

Endoscopic GIS (Gastrointestinal System) Interventions

Emergency GIS endoscopy is needed especially in patients with upper and lower GIS bleeding. Covid-19 is highly contagious via droplets and aerosol,

and although it is found in high concentration in the nasopharyngeal mucosa, the presence of the virus has also been demonstrated in the lower GI tract. Even though it is necessary to determine which patients will undergo emergency endoscopy, the main point to consider is the provision and use of personal protective equipment. Personal protective equipment is very important as the virus is transmitted via droplets and aerosols and can be contracted by contacting with surfaces. Fecal-oral transmission has not yet been proven; however, the upper GIS is as dangerous as the respiratory system in terms of infectivity. Viral RNA can be detected for approximately 16 days in respiratory tract analyses and for approximately 27 days in stool analyses. There is information in the literature that it may be a marker in determining asymptomatic patients, regardless of the disease severity and because it remains positive in stool for a longer time. Although patients are screened with the Covid-19 test, the biggest problem is the group with negative test results but who carry the disease. In the future, the determination of IgG and IgM may be the solution to this problem.

In Covid-19 positive or suspected-unknown patients, the endoscopist should ensure hand disinfection, use surgical gloves, goggles and bonnets, wear a liquid-tight gown and an FFP2/3 mask prior to the procedure, just like in operating room conditions. Then the endoscopist should wear a face shield and a second layer of gloves. After this preparation, the endoscopist should enter the room in which the procedure will be performed, and personal protective equipment must be changed for each procedure. Malignant polyps, prophylactic interventions for hereditary reasons, large benign asymptomatic polyps, and asymptomatic carcinoids of the colon and rectum are conditions that can be postponed for three months, regardless of a previous resection.

Operating Environment and Conditions

There is no need to take precautions for surgical patients who have tested negative for Covid-19, without any symptom and suspicion. For patients who have tested positive and have a suspected disease that cannot be ruled out by test, the operation should be planned to include taking precautions for Covid-19. The entrance door to the operating room, in which suspected or positive Covid-19 patients will undergo surgery, should be different from other rooms. As far as possible, throughout the outbreak, stable materials in the room (such as ventilators, tables...) should not be moved. Also, as far as possible, as one of the most important issues in the prevention of infection, there should be

minimum staff in the room, and all unnecessary personnel should be prevented from entering this room.

Emergency Surgical Procedures for Suspected or Positive Covid-19 Patients

General surgical operations, procedures that are usually carried out as preoperative, perioperative and postoperative teams, require continuous information exchange among the team, and may be prolonged due to complications. When we consider the long working hours of our teams, it is not hard to realize that the people with whom we are most in contact are our team members. Therefore, in the management of the Covid-19 outbreak, the number of people in the surgical team is crucial. Minimum contact is ensured if emergency outpatient clinic services can be carried out by dividing the surgical team into several groups. Furthermore, when a positive case occurs in the surgical team, the team with the positive member should be isolated, while other teams maintain the emergency outpatient clinic services without disruption. To minimize contact even within the same team, patient visits should be made by a single physician, and information should be shared and evaluated in a digital environment. The approach to patients who will undergo surgery can be classified as before, during and after the operation.

Preoperative assessment is the surgeon's evaluation of the patient in terms of preoperative indication for the operation. In order to prevent excessive contact with personnel, it is important that the person who will examine the patient is also the person who will decide on the operation. The surgeon should examine the patient's file beforehand, to avoid excessive and unnecessary contact with the patient. The surgeon should record patient information electronically. If suspected or positive for Covid-19, the patient must be informed that surgery could cause respiratory complications and mortality. Even in the event of not having Covid-19, the patient should be informed about any positive inpatients and the perioperative and postoperative risk for infection. The information provided to the patient must be documented, and the patient's signed informed consent must be obtained. If possible, information should be shared digitally with other physicians who will assess the patient preoperatively.

During the operation, the surgeon should wear personal protective equipment. Personal protective equipment includes mask (FFP2/3 or N95), goggles or transparent face shield, liquid-tight gown, long surgical gloves, disposable bonnet (personnel should cover all their hair with the bonnet), and sterile

rubber boots or liquid-tight shoes covering up to the ankles. Beards that prevent the mask from fitting properly should be shaved. After putting on the personal protective equipment, the surgeon should wear a sterile gown and a second glove should be worn after disinfecting the first one. The operating room should be a negative air pressure room. Furthermore, the anteroom must also be equipped with negative pressure. The ventilator in the room must remain constant; however, an additional filter is attached to the expiratory extension. This filter should be changed after each patient. If possible, the patient should be intubated with a video laryngoscope to avoid time-wasting. Anesthetic medications are kept in the induction room and all necessary medications are taken inside on a tray before each operation. In the event of an intraoperative requirement for an additional medication, the medication should be removed from the medication trolley only by paying attention to hand sterility and without touching anywhere. Airway equipment should be disposable, as far as possible. For out-of-room transport procedures, such as sending arterial blood gas samples, a person who is outside the room and has full personal protective equipment is kept on standby. It is still unclear whether the operation should be conventional or laparoscopic. While the surgeon's exposure to body fluids and cautery smoke is higher in conventional operations, due to the gas in laparoscopic surgery there may be a risk for aerosol transmission. Smoke generated during laparoscopic surgery may have a viral load. Using central aspirators or CO₂ filters may be a solution. Whether to undertake laparoscopic or open surgery should be determined by considering the surgeon's experience and the method that will enable the patient to have the shortest hospital stay.

In the event that there will be no postoperative stay in the intensive care unit, the patient should be fully awakened in the operating room and then sent directly to the bed. For patients where it is known that they will require postoperative intensive care in the preoperative assessment, the ventilator scheduled for use in the intensive care unit can be used perioperatively and the patient is taken to the bed using the same ventilator. The routes and elevators used by the patient while going from the operating room to the bed must be cleaned by hospital security. The same cleaning procedure is carried out by hospital security while the patient is taken to the operating room from the ward or examination room, and the accompanying nurse should wear personal protective equipment such as N95 mask, face shield or goggles, gloves, and liquid-tight apron. If the ventilator is to be changed for patients coming from or going to the intensive care unit, the endotracheal tube should be

completely closed with forceps. Any unused materials in the perioperative room are also considered to be contaminated. Everything, from the computer cables to the unused keyboard, should be considered soiled and cleaned. The required disinfection of the operating room should be ensured by taking a minimum of a one-hour break between two operations. The cleaning of the operating room should not be limited by a specific time; another patient should be taken after cleaning is completed. Thus, the waiting period between two patients may take up to two hours. After a patient with confirmed Covid-19, the operating room should be disinfected with hydrogen peroxide vapor. Patients should be followed-up in postoperative isolated rooms and if necessary be initiated on Covid-19 treatment. Empirical antibiotherapy is routinely administered in some clinics to patients postoperatively admitted to the intensive care unit, while other clinics use it as needed. It should be kept in mind that severe patients are at greater risk for venous thromboembolism. For these reasons, the postoperative follow-up of the patient should be carried out by several clinics and in cooperation.

CONCLUSION

In future, epidemics have the potential to be the greatest disaster for the entire planet. While we could not imagine our current state prior to experiencing the pandemic, at this article is being written, live without isolation and Covid-19 has almost been forgotten. Whatever the cause of the pandemic, our world needs to have a defense plan against this immense danger. A joint declaration should be published on how each surgeon and healthcare professional will act in the event of an outbreak, by adding any future ones to the knowledge and experiences we now know and share, and this should be taught as a topic in medical school.

In society there is a widespread fear of infection. Patients who are at risk of severe disease are more frightened of infection, but delays in the referral of this vulnerable group can result in situations that are even more complicated. Since patients are not wrong about the fear of infection, seeking solutions in a pandemic is essential for all algorithms. As a solution, digital environments should be established to assess patients and the infrastructure should be strengthened and made available to every patient. Thus, each patient can be assessed by a healthcare professional, preventing unnecessary hospital referrals and referring patients with severe symptoms to hospital, which avoids, for the most part, delayed referrals and increased complications.

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