REVIEW ARTICLE

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Surgical Care and Resident Education during COVID-19 Pandemic

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ABSTRACT

COVID-19 pandemic is nearly affecting all surgical activities including providing a surgical care to the patients as well as a negative impact on the educational program of the resident doctors in nearly all surgical specialties. During this period, surgeons set out to find an effective solution to deal with patients who visit outpatient surgical clinics or emergency units especially those who are infected or in contact with an infected individual. Moreover, the continuity of the educational program to the residents, doctors and completion of the syllabus is an essential issue needs to be done in a complete organized manner. The aims are to provide the best solution for them (surgical patients and resident doctors) as well as reducing the risk of the infection to other patients, residents, and healthcare staff. Telemedicine can act as a substitute to many in-person consultation, therefore, it aids in controlling the infection. Many studies and recommendations are tackling this vital issue among surgeons from different specialties across the globe. Despite minor variations among these, these studies serve the above-mentioned purposes. We highlight in this narrative review to give the surgeons an appropriate plan for dealing with suspected or infected COVID-19 surgical cases and to complete the surgical educational program of the resident doctors.

Keywords: Surgery; Surgical care; Resident education; COVID-19 pandemic; Telemedicine.

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INTRODUCTION

COVID-19 pandemic is caused by an evolving virus called SARS-CoV-2. The WHO was named the infection as COVID-19. The disease may present as asymptomatic, mild, moderate, and severe forms. Although the majority of the infected individuals recovered completely from the infection, some patients carry significant morbidity and even mortality [1, 2]. Although doctors specializing in infectious diseases bear the primary responsibility in facing this pandemic, the pandemic affects surgeons and their daily work greatly [3, 4]. Therefore, during this devastating pandemic (never seen before), it is of utmost importance for the surgeons to know the essential aspect of this disease including its behavior, epidemiology, routes of transmission, clinical presentation, diagnostic tools, treatment options, and complications to perform their daily practice safely [5]. However, it is not an easy job in this period as well as the high risk of infection to the dealing healthcare workers and other patients.

There is a negative impact of the action from the doctors to direct the medical resources to overcome the evolving effect of the COVID-19 in the daily surgical practice including the care of the surgical cases and educational program for the nursing and resident doctors [6].

There are a lot of doctors and other healthcare workers infected by this virus, and some of them died while performing their duty towards their patients. Despite these fears, our humanity and medical ethics force us to do our best to give an assurance letter to the community that we are with them to overcome this disaster situation [7]. Moreover, the surgical conditions of the COVID-19 patients should be treated according to the local hospital guidelines for the prevention of the disease. This narrative review aimed to update the surgical plan in dealing with surgical cases during the COVID-19 pandemic period and to accomplish the educational program of the resident doctors. This review was presented at the Anbar 1st International Conference which was held on 28 – 29th November 2020.

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SURGICAL CARE

Previous procedures and work contexts in the surgical clinics are not compatible with the time of the COVID-19 pandemic. It is of utmost importance that all hospitals should adopt a policy to occupy the COVID-19 pandemic, according to the availability of human and equipment resources for each hospital. The detailed plan should involve the various surgical branches as well as dealing with different elective and emergency surgical cases, taking into consideration preventing the transmission of the disease. In the following, we mention the problems that arose and the effective solutions to them. We discuss the various levels of surgical care from receiving the patient to the follow-up. Beside, we highlight a discussion on the resident doctors' education during COVID-19 pandemic. These include the following aspects:

A: Dealing with the patients in the outpatient or consultation room

Of note, there is an increasing fear that the COVID-19 may have a severe negative impact on the healthcare system. In terms of numbers, there is a sharp decline of 67% in the number of patients attending outpatient clinics during the time of this pandemic compared to previous years [8]. However, protecting people from this epidemic and the health risks it causes, including death, are among the lofty goals of any health system. In the following, we discuss the measures necessary to protect patients, their companions, and health personnel in surgical clinics.

Different countries adopt certain measures to avoid transmission of the COVID-19 which are similar to those used for other respiratory infections. Keeping the social distance is the most important approach used among many others like wearing a face mask, hand washes with running water and soap, prevention of unnecessary travels, closing relatively crowded places such as bars and restaurant, use tissues for sneezing and coughing, and so on [9].

Telemedicine is a great step in achieving control of this infection. It has many benefits, including reducing the spread of infectious diseases, a good health benefit when compared to examining patients in outpatient clinics [10], reducing travel expenses, and being away from work [11]. Moreover, it decreases the burden on the outpatient surgical clinics and if possible, previous appointments should be achieved through telemedicine [12]. Nevertheless, telemedicine is not a solution for all cases. Furthermore, there are a considerable number of patients without overt features of COVID-19 like fever and cough, and they carry a risk to the dealing surgeons. Therefore, the surgeons should take certain respiratory protective measures for all patients they deal with [13].

In cases where patients need to be present in surgical clinics to provide the best service to them, it is necessary to follow the following:

1. **Patient attendance:** The patient should come either alone or with one accompanying person, avoidance face-to-face appointments, call the reception area before arrival to ensure there is no overcrowding, and regardless of screening patient should wear a mask while at the office or clinic [14].
2. **Physical distancing:** It is necessary to keep at least 1.5 meters of space between the individuals and providing a one-way direction of flow through a clinic [15].
3. **Direct consultations:** At the clinic entrance advisable for staff to directly ask patients regarding symptoms or if they have been in contact with anyone diagnosed with COVID-19 [16].
4. **Regular cleaning** of the outpatient places, particularly the high-touch surfaces [17].

Of note, surgical patients should be advised to avoid visiting out-patient clinics if they develop fever or respiratory features like a cough or dyspnea, or have COVID-19. Besides, the surgical staff should have an experience in dealing with COVID-19 patients during physical or virtual consultations [16].

B: Dealing with the patient in the emergency unit

During the COVID-19 pandemic, there is a decline in the whole number of emergency cases, hospital admissions, and surgical operations [18]. This could be attributed to two main reasons, fear of the patients from visiting the hospital and the decrement in the number of accidents owing to the quarantine application.

In the era of a COVID-19 pandemic, the hospital administration as well as the healthcare staff is busy and thinking about how to overcome such a difficult situation. The first priority is to preserve high necessary resources such as beds in the intensive care unit (ICU), ventilators, and personal protective equipment (PPE). These resources are shifted to save the life of the severely infected individuals. Besides, the ICU and emergency unit should be away from the main entrance of the hospital to reduce intra-hospital transmission among patients, visitors, and staff. Therefore, dealing with emergency cases depends on the availability of the operating rooms as well as essential equipment that able to reduce the transmission of the SARS-CoV-2 virus inside the theaters [19].

Certain patients still need medical or surgical care in this pandemic or even in another similar pandemic, natural disasters, and a accidents crisis. Therefore, the principles of management for emergency surgery are the same as in non-pandemic circumstances. However, certain modulation should be adopted, firstly, dealing with symptomatic COVID-19 cases should be according to the COVID-19 guidelines. Those patients should be investigated by either chest X-ray or ultrasound of the chest or chest computerized tomography (CT) or a combination of them to confirm or rule out COVID-19 (peripheral ground-glass consolidations) [20–23]. Secondly, for asymptomatic patients or with negative tests for COVID-19, standard operating room precautions are required. Thirdly, limit the delay of interventions and maintaining the quality of interventions are of utmost importance. Fourthly, it is better to decide for admission by at least two surgeons. Fifthly, keep the number of personnel to a minimum in the theater. Lastly, reduce the hospital stay of a patient undergoing emergency surgery as much as we can [24].

C: Preoperative assessment

The routine surgical practice of preoperative evaluation is changed in the era of COVID-19. Health care staff is strictly used certain perioperative measures like PPEs to reduce the incidence of virus transmission from infected to healthy subjects [25]. Disinfectant gel or spray is useful to be used by the surgical team for hand hygiene before and after contact with patients and following the removal of the gloves [26, 27]. Owing to the high possibility of the transmission of the virus and even the death results from this infection, screening of all patients, although they are asymptomatic, is of extreme

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importance [12, 28]. Fever is one of the primary features of patients with COVID-19. Therefore, examination of all hospital visitors for this symptom is very necessary. Fever is not considered a dependable pre-operative examination tool because it is not detected all infected individuals [29]. Therefore, screening of all patients by real-time polymerase chain reaction (RT-PCR) test is recommended by most of the studies [30], unless there is a shortage in the human and material resources. In such situation, dealing with all patients as they are infected by the virus is essential.

Medical workers are more likely than others to be infected by being in contact with patients and their families, and at the same time, they are an important factor in transmitting the disease. Therefore, they must be subjected to daily checks of their body temperature to ensure their safety. Any of them who discovers that his body temperature is high, then he must be isolated and is tested for the virus to prove his infection or not [27].

Consultation through various methods of telemedicine is an excellent option at the preoperative stage to reduce the time of direct contact with patients [31]. The majority of the surgical consultation can be undertaken through this kind of medicine like thorough history and a brief examination through transferring certain images of the patients to the dealing doctor. However, preoperative investigations and essential steps of surgical and anesthetic examination are performed in extreme precautions.

D: Consent

Informed consent is an essential step of the surgical operation, in which the dealing surgeon gives information from the data in the literature to the patient regarding the options of treatment to assist the patient to make an informed decision of the required option of the treatment [32]. We can summarize this information according to each letter in the word CONSENTS, C=Condition, O=Options of treatment, N=Name of the operation, S=Side effects or complications, E=Extra procedure/s, N=Name of the surgeon, T=Training and Teaching, and S=Second opinion.

In addition to routine consent from a surgical patient, the patient should understand and accept the possibility of getting COVID-19 with its complications (particularly pulmonary complications) and even mortality. Moreover, it should be taken electronically [32, 33].

E: Surgical operations schedules

According to the American College of Surgeons (ACS), elective surgical operations are defined as low or intermediate procedures that can be delayed safely without potential risk to the subject [34]. It is advised to postpone all elective surgical operations unless this delay has negative effects on the patients [30, 35]. This action can be taken not more than 2-3 months, until the healthcare system returns to its normal condition [30].

The advantages of reducing the elective surgical operations are, firstly, the general surgical wards and ICU beds can be used to admit COVID-19 patients. The recovery rooms can be modified to be additional ICU beds. Second, the release of surgical and anesthetic staff is used in taking care in the emergency and ICU units. Lastly, the risk of transmitting infection from hospital visitors to elective surgical patients will be greatly reduced [16].

F: Operative theater

Operating theaters are considered one of the very dangerous areas for the transmission of respiratory infections. Besides, the presence of many workers in one room when elective surgical operations are carried out, making healthcare workers in these areas more vulnerable to infection with COVID-19 [35]. Therefore, it is of utmost importance to take certain actions to reduce the risk of acquiring infection. During this disaster pandemic, we select an isolated operating room and anesthetic machine to remain for COVID-19 patients [36]. The surgical approaches and the type of anesthesia should be determined by a provisional team [33]. It is advisable to choose the shortest approach to decrease the time of the exposure of the operating personnel [26]. Local or regional anesthesia can be used if it is possible, otherwise, general anesthesia is required with the preference of using an endotracheal tube [33]. Securing of the airway should be done by a method with a high rate of first-time success, such as video-laryngoscope to prevent the drawbacks of the frequent attempts [37]. Keep the number of the operating staff to a minimum number with acceptance only limited number of trainee to be involved. Disposable instruments are preferable and prepared in advance in the specific theater room. The theater must have the following criteria include negative air pressure inside the operating room (reduce the transmission of the infection beyond the theater), well-identified areas for wearing and discarding the PPE, closure of all doors of the theater, and strict controlling the entry and exit [33, 36, 38]. Adoption of a principle of 3 areas (contaminated, potentially contaminated, and clean) which are separated by 2 adequate regions [39, 40].

High-speed drills and electro-cautery should be decreased to a minimum usage in surgical procedures to reduce aerosol production [12]. In addition, suction of the smoke is recommended [26, 41]

It is necessary to make a gap of one-hour duration between the surgical cases to provide an adequate time for the preventive measures of infection, as well as use disinfection procedure of the operating room after each surgical operation [33, 36].

G: Postoperative care

This aspect aims to shorten the hospitalization period as much as we can to keep the transmission of the SARS-CoV-2 virus at the lowest level. Below are the basics for achieving the desired goals. First, after an operation, the patient is brought to an isolated intensive care unit or isolated room according to the hospital guidelines [41]. However, COVID-19 free patients are transferred to the usual surgical ward to get routine postoperative care. Second, during the hospital stay, daily evaluation of the temperature and respiratory features are necessary [27, 33]. Third, use an effective attempt in preventing or treating complications that may occur after the operation. Isolation of all suspected cases of nosocomial COVID-19, as well as real-time PCR test of the naso or oropharyngeal swab and CT scan of the chest, are performed as early as possible [27]. Fourth, use advanced technology, like autonomousrobots, to deliver drugs and clean wards [27]. Fifth, use day-case surgery for non-complicated operations will reduce the time of post-operative follow-up [27]. Six, substitute the routine frequent postoperative visits with online checking of patient's documents on hospital electronic information system (HIS) and short daily visits or phone calls [27]. Lastly, limit the number of visitors to a minimum to

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reduce the risk of the infection is highly recommended [27].

H: Follow-up

Telemedicine (via a video or phone call) should be used as a substitute for routine follow-up. If it is necessary to use a follow-up in person, it should be scheduled in an appropriate place and time. Besides, the phone numbers of the surgical staff are given to the patients, they can be used if they have any questions or quires. Moreover, the patients should strictly follow the discharge letter instructions [42].

I: Dealing with the cancer patient

Cancer centers during the COVID-19 pandemic as many other healthcare services have been greatly affected [43]. For example, in Europe, at the time of the first wave of the COVID-19 pandemic, there was a negative impact on oncology centers as shown in a survey of the surgeons. The follow-ups cancellation, fear of cancer patients from attending the cancer clinics, and deferred operations are the reasons for the increment in the number of unresectable tumors and poor survival outcomes [44]. Many centers adopt a policy to reduce their services following preliminary studies from China that revealed the outcomes of COVID-19 are more worse in subjects with cancer than healthy individuals [45]. In most cancer cases, there is no harm from delaying services. However, some cases may have serious consequences if the treatment is delayed [46–48]. Besides, delay treatment increases the stress and fear among cancer patients. As a result of the negative impact of the pandemic, it is logical to take a decision of care for those patients with potentially curable cancer and postpone cases for who they need palliative treatment. Moreover, a balanced decision should be undertaken between the risk of getting a SARS-CoV-2 infection with its complications and the possible advantages of the treatment of cancer cases.

TEACHING THE RESIDENTS DOCTORS

Resident doctors faced a great fear during their job of giving surgical care during this pandemic and other epidemics such as severe acute respiratory syndrome (SARS) and middle east respiratory syndrome (MERS), these included risks of getting an infection and transmission of the infection to the family members or lovely friends [49]. As a consequence of these fears, surgical care providers end with psychological disturbances like anxiety, chronic post-traumatic stress, and depression years following the termination of the pandemic [50].

There is a strong negative impact on the teaching program of the resident doctors during the COVID-19 pandemic due to the limitations produced by many organizations including the Centers for Disease Control and Prevention. Therefore, the educational program is a challenging issue, especially since the time of these limitations is unknown [51]. Among the obstacles to the education that were recommended by the Centers for Disease Control and Prevention is the avoidance of the presence of more than ten people in one place [52]. Therefore, the teaching program was compromised because of many teaching lectures and interactive scientific activities like grand tours were removed from the program. Besides, there is a sharp reduction in the clinical cases in the outpatient clinics and emergency units which affect greatly the teaching program of the resident doctors. Lastly, the delaying process of elective surgical procedures, the curriculum of all surgical specialties will be greatly affected. As a consequence, we use different virtual platforms as a substitution way to finish the curriculum [53].

CONCLUSION

The COVID-19 pandemic has greatly affected all disciplines, including the surgical field. A policy adopted by the hospital must be established to deal with both elective and emergency conditions. The hospital is a good medium for the transmission of the infection, therefore, strict precautions according to each stage of surgical care should be undertaken to prevent the transmission of the infection among patients, visitors, and surgical staff. Telemedicine plays a major role in achieving these aims; giving surgical care and avoidance of the transmission of the COVID-19. Virtual activities may aid for a completion of the resident's education program.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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