

Management of Trauma And Surgical Procedures in Children During The COVID-19 Pandemic

COVID-19 Pandemisinde Çocuklarda Travma ve Cerrahi Prosedürlerin Yönetimi

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ABSTRACT

Coronavirus 2019 (COVID-19) infection was first identified in China and spread to the whole world in a very short time. The COVID-19 pandemic was declared by the World Health Organization (WHO) in March 2020 due to the rapid increase in the number of cases and deaths. Studies show that the virus is primarily transmitted by respiratory droplets and close contact. Although 90% of children are asymptomatic or have mild symptoms, they should be accepted as positive until they are proven negative regardless of any complaints. Despite the process, trauma, burn and surgical emergencies continue to concern pediatric surgeons. The basic principles those generally accepted during Covid-19 pandemic are to perform emergency and urgent surgical procedures and to reschedule elective surgeries. However, the most important issue in the process is to take precautions for protecting the healthcare team and to plan keeping hospital reserves. We aimed to adapt general principles of trauma and surgery to the COVID-19 pandemic in children and to discuss the specific conditions in our review.

Key Words: COVID-19, Pandemic, Pediatric surgery, Surgical procedures, Trauma

ÖZ

Coronavirus 2019 (COVID-19) enfeksiyonu ilk olarak Çin'de tanımlanmış olup tüm dünyaya kısa sürede yayılmıştır. Vaka ve ölüm sayılarındaki hızlı artış nedeniyle Mart 2020'de Dünya Sağlık Örgütü (WHO) tarafından COVID-19 pandemi ilan edilmiştir. Çalışmalar virüsün özellikle solunum damlacıkları ve yakın temas yoluyla yayıldığını göstermektedir. Çocuklarda hastalık %90 oranında asemptomatik veya hafif seyirli olmasından dolayı her olguya yakınması olmasa bile aksi ispat edilmeye kadar pozitif gibi yaklaşılmalıdır. Sürece rağmen travma, yanık ve cerrahi aciller çocuk cerrahlarını meşgul etmeye devam etmektedir. Pandemi esnasında, acil ve ertelenemeyen cerrahi işlemlerin yapılması, elektif cerrahilerin ertelenme prensibi benimsenmiştir. Ancak süreçte önemli olan, travma sonrası izlemde ve/veya cerrahi işlemler esnasında olası bulaş riskinden dolayı sağlık ekibini korumaya yönelik önlemlerin tam alınması ve hastane şartlarının doğru planlanmasıdır. Derlememizde, çocuklarda mevcut travmaya yaklaşımın ve cerrahi prensiplerin COVID-19 pandemi sürecine uyarlanması, ortaya çıkan özellikli durumların tartışılması amaçlanmıştır.

Anahtar Kelimeler: COVID-19, Pandemi, Çocuk cerrahisi, Cerrahi girişimler, Travma



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INTRODUCTION

Severe acute respiratory coronavirus 2 (SARS-CoV-2) and also named as Coronavirus Disease 2019 (COVID-19) was first described in December 2019. Although Wuhan, China was the first place where the disease was seen, it spread to whole world in a very short time and was declared as a pandemic by the World Health Organization (WHO) in March 2020 (1). According to the Centers for Disease Control and Prevention (CDC) data on April 2020, there were approximately 900.000 cases and 45.000 death cases related with Covid-19, and the number of deaths are still reaching around 320.000 by the end of May, 2020. It is remarkable that 22% of all cases in America are infants, preschool children and adolescents (2, 3).

Surgical emergencies continue to concern the pediatric surgeons and they also have to deal with trauma and burn which are likely candidates for surgery. Despite the pandemic, main principle remains to provide timely surgical care. However, treatment plans should be revised by taking preventive measures for the healthcare team, who has close contact with the patients. It is recommended to question the patients about the presence of complaints or symptoms with the laboratory diagnosis of COVID-19 is based on a positive rRT-PCR (reverse transcription polymerase chain reaction) ideally. But tests can be false negative in the incubation period and their predictive value may not represent accurate results. Epidemiological and clinical data should be evaluated together (4). All the traumas and surgical patients should be managed with the following details.

Laboratory Diagnosis of Covid-19 is Based on A Positive Rt-Pcr

A. Epidemiological data

1. Does the patient live or come from a COVID-19 affected region in the last 14 days?
2. Did the patient have any close contact with COVID-19 during the last two weeks?
3. Are there any complaints of fever and/ or cough during the last two weeks?

B. Clinical / Radiological / Laboratory data

1. Are there of fever and/ or respiratory symptoms?
2. Is there any imaging characteristics of COVID-19?
3. Do the patient's blood tests reveal a reduced level of white blood cell (WBC) count or lymphocytes.

Accordingly, if there are one epidemiological and two or three clinical data, the patient should be considered as COVID-19 suspected/ positive regardless of the presence of epidemiological data (4).

General Principles For Medical Centers

A patient entering emergency department should be evaluated for the presence of specific symptoms or complaints of COVID-19 initially. At the same time, the urgency of patient's condition and requirement of intensive care must be determined. The patient should be isolated from other patients in the presence of high-suspicion. A dedicated imaging room (X ray, CT) should be arranged for these patients, and a predetermined transport route minimizes exposure. Personal protective equipment and medical masks have to be worn by both the patient and healthcare team.

Organizing the use of intensive care unit (ICU) may help keeping hospital reserves. Isolated area is recommended in the ICU and the treatment should be provided in a single area for the patients with suspected or confirmed COVID-19.

A three-level precaution protocol is defined to standardize measures. When a trauma patient is admitted to the emergency service, the assessment should be done according to the above criteria. But, it should be noted that the incubation period of COVID-19 may last up to 24 days. Therefore, even if there is no epidemiological or clinical finding, it is recommended to apply level 1 measures. Level 2 / Level 3 protective protocols should be used in the patients with suspected/ positive epidemiological and clinical data.

Level 1 precautions should be used in triage and at emergency room. The healthcare professionals have to use clean, non-sterile long gown, a disposable head cover, medical mask and gloves.

Level 2 should be applied at the presence of close contact with suspected patients, or exposure to blood or other body fluids/substances. Head cover, gloves, N95 respirator or equivalent, and rubber boots are included at level 2. In addition, all dressings should be done with level 2 protective equipment in burn cases.

Level 3 precautions are necessary for close contact with suspected patients, exposure to blood, respiratory tract samples like endotracheal intubation. Also, emergency surgery is another situation that level 3 measures must be applied. Measures should be strengthened compared to level 2. Wearing secondary protective equipment such as face shield, two layers of gloves/ protective overalls are included at level 3.

Surgical Interventions

The surgical procedures are categorized into three groups by the American College of Surgeons. The classifications are done according to the urgency of interventions. The main principles are to protect healthcare workers and hospital resources as shown below (5).

- A** Emergency situations (life threatening if delayed).

B Urgent cases (harmful for the patient within days or weeks if postponed).

C Elective cases (delaying brings minimal risk to the patient.)

The basic principles, among those generally accepted during Covid-19 pandemic are to perform emergency and urgent surgical procedures and to reschedule elective surgeries. Recent reports showed that the virus is primarily transmitted through respiratory droplets and close contact. Based on the fact that the disease is 90% asymptomatic, or moderate in children, consideration should be given to the possibility of viral contamination in each patient. It is strongly recommended to take preventive measures for considering the risk of inflow by droplet. The procedures should be planned by prioritizing personnel safety. When we apply pediatric surgery practices to the Covid-19 pandemic, the important points are summarized below as items.

a Timing for surgery

- “Emergency situations” are identified as the cases that any delay can be life-threatening. Acute intestinal obstruction, traumas, burns, appendectomy for acute appendicitis, most of congenital anomalies of newborn and foreign body aspirations can be evaluated in this status. The recommendation for the emergency cases is to perform surgery immediately without ignoring the protection of health workers. Interesting details related with Covid-19 in neonates (5). Although no findings of SARS-CoV-2 were found in newborns born from affected mothers, a recent study suggested that vertical maternal-fetal transmission can be a possibility. Therefore, Covid-19 positivity should not be kept in mind for neonates who undergo for neonatal surgery (6).
- The cases like most of the oncologic surgeries, portoenterostomy for biliary atresia, vascular access device insertion and symptomatic inguinal hernias can be evaluated in “urgent cases”. More than a few days or weeks of delay can be harmful for these groups of patients. The most preferred approach is performing surgery immediately after the appropriate conditions should be provided.
- “Elective cases” cause minimal risk for the patient due to delay. Most of outpatient surgical procedures like asymptomatic inguinal hernia and anorectal malformation or Hirschsprung Disease reconstructions following diversion can be given as examples for elective cases. The surgical care should be limited to those which may be harmful to the patient due to any delay.

b Securing healthcare workers

Although patients undergo preliminary assessment for the possibility of COVID-19, surgical procedure of asymptomatic

patient can risk the healthcare team. The procedures should be planned with the goal of securing healthcare workers.

c Selection of surgical procedures

There is little evidence to suggest/against the open and laparoscopic approach; however, the surgical team should choose an approach that minimizes OR (operation room) time and maximizes safety for both patients and healthcare professionals (5). The risk of viral contamination is a serious entity whether it is related to laparoscopic or open surgery. The general principle is that all operations should be performed quickly and effectively in order to reduce contact (8).

The American Gastrointestinal and Endoscopic Surgeons Association (SAGES) and European Association for Endoscopic Surgery (EAES)’s “Surgical response to COVID-19 crisis” recommendations are essential if needed (9).

d Management of Operating Room

- An operating room (OR) should be identified for all confirmed or suspected cases of COVID-19. The OR should have negative atmospheric pressures. -10 /-5 pKa pressure is recommended.
- The use of humidification system is not recommended in the operating room. The aspiration system should not be connected with the main system.
- When the patient is placed on the operating room table, the negative pressure aspirator should be placed in the patient’s mouth and nose area to prevent secretions from spreading into the room.
- It is recommended to apply level 3 measures for emergency surgeries.
- Aerosol-producing procedures (AGPs) should be an important risk for the healthcare team, but cannot be prevented. AGPs have to be performed when full PPE is worn, including an N95 mask. Intubation, extubation and bag masking can be listed in AGPs. This is a serious risk for the medical team and the anesthesia team who are using the same operating room. Moreover, procedures like bronchoscopy and chest tubes are included in the AGPs, and pediatric surgeons should be careful when doing these surgical procedures. AGPs, are listed below.

a Bronchoscopy, chest tubes

b Blood electrocautery, contact to any gastrointestinal tissue, or body fluids

c Laparoscopy / endoscopy

For minimal invasive surgery (MIS), incisions for the ports should be kept as small as for the guidance of intervention, but not allow for leakage. CO₂ insufflation should be kept to minimum and CO₂ should be evacuated totally after the procedure. Care should be taken about the virus that can survive in aerosols for hours and on surfaces for days (10).

Although it is recommended to postpone elective cases as much as possible in the COVID-19 pandemic, the feature that distinguishes pediatric surgery from many other branches is that there are many causes of emergency surgery. In addition to trauma, many surgeries that cannot be postponed require urgent intervention. Therefore, in cases where surgery is unavoidable, appropriate protective measures should be the most important issue to ensure the safety of the personnel.

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