

A model for perioperative care in a suspected Covid - 19 patient. Breaking the chain of transmission

Rashid A MS, FNB (MAS)¹, Nazir S MD², Junaid S MS³, Mir I MS¹, Zaiem M MS¹

ABSTRACT

A model for perioperative care in a suspected Covid - 19 patient. Breaking the chain of transmission.

Rashid A, Nazir S, Junaid S, Mir I, Zaiem M.

COVID-19 has officially been declared as a pandemic. Although the ultimate course and impact of COVID-19 is yet to be seen, the disease has already overwhelmed health care infrastructure. Operation theaters are high-risk areas for transmission of respiratory infections given the involvement of multiple staff, and the need for high transmission-risk aerosol generating activities. The current study aims to establish a guide for establishing optimum protection conditions that should be done before, during and after surgical intervention. A clear plan has to be developed to only provide essential surgical care during the pandemic. All the elective and non-essential procedures need to be deferred. Whenever close contact is mandated with the suspected patients, the staff should wear proper personal protective equipment. There should be proper training in the appropriate use and application of PPE. The most important thing in the chain is hand hygiene and 70% alcohol solutions should be placed strategically. Universal pre-operative testing of patients is discouraged. Minimum possible staff should be used to transfer the patient to and from the operating theater. The path of the patient should be kept clear. Consider designating a specific operating theater for all suspected COVID-19 cases. Though general anaesthesia is not contraindicated in suspected or confirmed COVID-19 cases, regional anesthesia with IV sedation, if feasible, should be preferred. Bag mask ventilation should be avoided for as long as possible. The most skilled provider should do intubation. The risk of aerosol exposure and the resultant

transmission of infection to the operative team during a laparoscopic procedure is a likely issue and have led people to advocate open surgery in suspected COVID-19 patients. Laparoscopic surgery in COVID-19 positive patients should be

¹Department of Surgery, Government Medical College, Srinagar, Kashmir, India.

²Department of Community Medicine, SKIMS Medical College, Srinagar, Kashmir, India.

³Department of Surgery, District Hospital, Budgam, Kashmir, India.

performed in a negative pressure room and smoke evacuation systems should be used. The patient should be extubated in the operating room itself and should be shifted only once they have recovered fully. Appropriate disinfection of atmosphere and OT walls and floors should be done. Patients should be shifted to an area earmarked for COVID patients. Negative airflow should be used preferably in areas that are reserved for suspected COVID-19 patients. It is essential that every center develops its own protocols bearing in mind the local factors, but the protocols developed should be followed stringently in order to break the transmission of COVID-19 and protect health-care workers and the patients alike.

INTRODUCTION

Starting as an outbreak of pneumonia of unknown origin in Wuhan, COVID-19, as it was named later on, spread rapidly from Asia and Europe to involve whole of the world¹. With over 2.5 million cases and involving more than 200 countries and territories all over the world, COVID-19 has officially been designated as a pandemic². Although the ultimate course and impact of COVID-19 is yet to be seen, the disease has already overwhelmed health care infrastructure³. During the current pandemic, we remain steadfast and dedicated to excellence in the clinical care of our patients. Based on the guidance of hospital epidemiologists, state and local health care departments, and national and international surgical and anaesthetic societies, most hospitals have severely curtailed the performance of non-urgent surgical procedures in anticipation of the need to redeploy healthcare resources to meet the projected massive medical needs of patients with COVID-19⁴⁻⁶. The

major challenge for surgeons, and anesthesiologists, is to maintain the provision of emergency and essential surgery while preserving precious resources, and minimizing the exposure of health care workers, and preventing onward transmission of the disease. Operation theaters are high-risk areas for transmission of respiratory infections given the involvement of multiple staff, and the need for high transmission-risk aerosol generating activities such as airway management or use of electro-cautery and desufflation of pneumo-peritoneum during laparoscopy⁴⁻⁶.

Protection of health workers, other patients, measures for operating rooms and surgical and anaesthetic equipment, and pre-operative, intra-operative and post-operative management should be defined in case of emergency operation in patients with suspected or confirmed COVID-19 infection. It is imperative for us to develop protocols so that our systems can sup-

port essential surgical care while protecting patients and staff, and at the same time conserve valuable resources. Proper planning and execution are necessary to implement these strategies. The current study aims to establish a guide for establishing optimum protection conditions that should be done before, during and after surgical intervention. We propose to use the following protocol in case of suspected or positive COVID-19 patient requiring emergency surgery, and is described under three heads – pre-operative, intra-operative and post-operative setting.

PREOPERATIVE SETTING

A clear plan must be developed to only provide essential surgical care during the pandemic. All the elective and non-essential procedures need to be deferred. At our institute/hospital, we are only providing emergency and elective cancer surgeries. In case a hospital has not a dedicated COVID (exclusive) facility, suspected or confirmed COVID patients should be kept geographically separate from non COVID patients to minimize nosocomial transmission, and a separate COVID ward should be designated. Such a patient should always wear a mask, even a cloth mask or a surgical one. Whenever close contact, such as surgical intervention, intubation, regional anesthesia, cannulation or catheterization is mandated with the suspected patients, the staff should wear proper personal protective equipment (PPE), which consists of N95 mask,

Coverall suits, visors /Face-shields and Goggles. There should be proper training in the appropriate use and application of PPE. Without consuming the resources, staff should be made aware of proper donning and doffing techniques of PPE by video demonstration and posters mounted on walls. The most important thing in the chain is hand hygiene and 70% alcohol solutions should be placed strategically⁷.

Unnecessary patient, family, and health worker movement through the designated COVID area of the hospital should be discouraged as it decreases the introduction and transmission of disease. The surgical and anesthetic staff should be rationed in order to preserve human resources³. Students, in particular, should not be involved with known or suspected COVID positive cases unnecessarily. There is no need of any special decontamination methods for cleaning linens other than the routine machine laundering with detergent; and all surface areas should be disinfected with 70% alcohol solutions or benzalkonium chloride or hydrogen peroxide⁷.

In case the hospital resources are overwhelmed by high caseload of COVID-19 patients, prioritization of interventions needs to be done. Operative interventions in COVID positive individuals should go first to front-line health care workers and others who care for ill patients and who keep the critical infrastructure operating, particularly workers who face a

high risk of infection and whose training makes them difficult to replace. Given the necessity of these individuals in fighting the current pandemic, this prioritization should not pose an ethical dilemma, though we agree that there are still no legal measures to this effect. Priority for critical workers must not be abused by prioritizing wealthy or famous persons or the politically powerful ones above first responders and medical staff³.

Universal pre-operative testing of patients is discouraged as it has certain demerits – sufficient tests may not be available everywhere, patients in emergencies may require interventions even before the results of tests are up and there could be chances of false positive results. But without regard to these investigations, a non-contrast computed tomographic scan of chest should be performed in every suspected patient. This will not only help in substantiating diagnosis of COVID-19 but also alert the intensivist to the underlying lung reserves, which is of paramount importance. A written and informed consent should be obtained from the patients, specifically adding that COVID-19 may add to the morbidity and mortality of the procedure. The patient should be made aware of the fact that he/she may get COVID positive during hospitalization. Minimum possible staff should be used to transfer the patient to and from the operating theater. The path of the patient should be kept clear. This can be done using either security or a team member

travelling in advance of the patient to clear the way^{8,9}.

INTRA-OPERATIVE SETTING

Consider designating a specific operating theater (OT) for all suspected COVID-19 cases (*ideally with neutral or negative pressure*). It should be away from high-traffic areas and should preferably have an attached anteroom, which should be used as an area for donning and doffing of PPE. Exchange of equipment and materials needed for the case should also take place in the anteroom. If an anteroom is not available, a taped off area should be clearly marked for these activities just outside the door of operation OT. Posters regarding instructions on appropriate procedures should be displayed properly in the anteroom area. The designated OT should be emptied of all non-essential materials and equipment. Mobile phones, wallets and pens should be disallowed in this OT⁵⁻¹⁰.

Though general anaesthesia is not contraindicated in suspected or confirmed COVID-19 cases, regional anesthesia with IV sedation, if feasible, should be preferred in order to reduce aerosols. Non-invasive ventilation, high-flow nasal cannula, bag-mask ventilation, and intubation are particularly high-risk aerosol generating procedures and can result in transmission of the virus if proper precautions are not taken. Only the most skilled provider available wearing an appropriate PPE (N95 mask, Coverall suits, visors/Face-shields,

Goggles) should undertake such tasks. Whenever available, all aerosol-generating procedures should be done in an airborne infection isolation room¹¹⁻¹³. Bag mask ventilation should be avoided for as long as possible; and optimizing pre-oxygenation with non-aerosol-generating means like bed-up-head-elevated position, airway maneuvers, use of a positive end expiratory pressure valve, and airway adjuncts should be preferred. If bag mask ventilation is required, we suggest using a supra-glottic airway device with gentle ventilation. The patient's nose and mouth should be covered during pre-oxygenation with two layers of wet gauze to block some of the patient's secretions but caution should be taken to ensure that the wet gauze does not obstruct the patient's airway¹¹. Basic minimum staff should be present during intubation, and rapid sequence induction should be used. We prefer rocuronium as a muscle relaxant, owing to its longer half-life, which effectively prevents coughing or vomiting. The team must take great care to minimize hypercarbia¹¹⁻¹³. Videolaryngoscopy or fiberoptic bronchoscopy may be used as aids to intubation. As soon as the patient is intubated, the cuff should be inflated and checked for leaks. The endotracheal tube should be connected to the ventilator via an appropriate viral filter. If there are constraints of proper PPE, improvised protective barriers for endotracheal intubation can be used¹⁴.

The surgical team should be restricted to a basic minimum number of personnel who are quintessential for carrying out the given procedure safely. Needless to say, that they should be donned in appropriate PPE. The choice of approach: whether laparoscopic or open is still debatable. Each approach has its own advantages and disadvantages. The risk of aerosol exposure and the resultant transmission of infection to the operative team during a laparoscopic procedure is a likely issue and have led people to advocate open surgery in suspected COVID-19 patients^{4,6}. However, laparoscopy has its own advantages like shorter length of stay and the existence of anatomical barrier between the surgeon and the disease because the abdomen is not opened, reducing exposure to the disease and cross infections¹⁵. Laparoscopic surgery in COVID-19 positive patients should be performed in a negative pressure room and smoke evacuation systems should be used. The trocars should not be leaking and should fit the incisions snugly. Use of energy sources is discouraged in both open as well as laparoscopic surgery, or else there should be continuous evacuation of the smoke¹⁶.

Appropriate disinfection of atmosphere and OT walls and floors should be done. Plasma air sterilizers or ultraviolet lamps can be used to disinfect the air¹⁵. Hydrogen peroxide vaporizers can also be used for the same purpose. The floors and walls should be disinfected by hypochlorite solution. In case the disposable

anesthesia or surgical equipment is to be re-used, it should be sterilized by immersing in 2% Glutaraldehyde for a period of 30 minutes. Pulse-oxymeters, blood pressure cuffs, temperature probes and other re-usable materials should be thoroughly cleaned in between the cases⁷⁻⁹. The intra-operative wastes of these patients (including aspirator content, organs, feces, urine, used surgical materials) should be sealed in a non-porous container and disposed of separately.

POST-OPERATIVE SETTING

The patient should be extubated in the operating room itself and should be shifted only once they have recovered fully¹⁵. Either the patients should be shifted to intensive care unit, if needed or directly to the previously earmarked space for suspected COVID-19 patients. Again, the transfer should follow the previously mentioned protocol and the basic things as mentioned above should be followed religiously. Airflow in hospital wards can significantly affect the risk of nosocomial transmission¹⁷. Negative airflow should be used preferably in areas that are reserved for suspected COVID-19 patients. Certain precautions need to be taken if the suspected COVID-19 patients require mechanical ventilation. High efficiency viral filters need to be attached in line with the ventilator circuit and closed in-line suction should be employed, whenever necessary. Even after weaning the patient off the ventilator, closed systems with viral filters should be

used to administer oxygen, if needed. Unnecessary suctioning is strongly discouraged. If healthcare workers who had direct contact with confirmed or suspected patients become symptomatic, they must inform the hospital authorities and should undergo COVID-19 testing¹⁴⁻¹⁷. A lot will be asked of us all in the coming days, and we may well find ourselves stretched to our limits, but we will be remembered for our actions, and how we worked our way through this pandemic. It is essential that every center develops its own protocols bearing in mind the local factors, but the protocols developed should be followed stringently in order to break the transmission of COVID-19 and protect health-care workers and the patients alike. These protocols should be developed after proper planning and there should be appropriate quality control measures instituted. The protocols may need some modification as our understanding of the pandemic improves.

REFERENCES

1. Lu R, Zhao X, Li J, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet* 2020;395:565-74.
2. Fauci AS, Lane HC, Redfield RR. Covid-19 – Navigating the uncharted. *N Engl J Med.* 2020;382:1268-9.
3. Emaneul EJ, Persad G, Upshur R, et al. Fair allocation of scarce medical resources in the time of COVID-19. *N*

- Engl J Med. DOI: 10.1056/NEJMsb2005114. [Epub ahead of print].
4. Urgent Intercollegiate General Surgery Guidance on COVID-19. <https://www.acpgbi.org.uk/news/urgent-intercollegiate-general-surgery-guidance-on-covid-19/>. Accessed on 24th April 2020.
 5. COVID-19 and Surgery - American College of Surgeons. <https://www.facs.org/about-acsc/covid-19>. Accessed on 24th April 2020.
 6. <https://www.sages.org/recommendations-surgical-response-covid-19>. Accessed on 24th April 2020.
 7. Gao J, Tian Z, Yang X. Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. *Biosci Trends*. 2020;14:72-3.
 8. Protecting surgical teams during the COVID-19 outbreak. Available from: <https://journals.lww.com/annalsofsurgery/Pages/COVID-19.aspx>. Accessed on 24th April 2020.
 9. The distancing of surgeon from patient in the era of COVID-19 – Bring on the innovation. Available from: <https://journals.lww.com/annalsofsurgery/Pages/COVID-19.aspx>. Accessed on 24th April 2020.
 10. Wang D, Hu B, Hu C, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA*. 2020;323:1061-9.
 11. Park J, Yoo SY, Ko JH, et al. Infection prevention measures for surgical procedures during a Middle East Respiratory Syndrome outbreak in a tertiary care hospital in South Korea. *Sci Rep*. 2020;10:1-8.
 12. Missair A, Marino MJ, Vu CN, et al. Anesthetic implications of Ebola patient management: A review of the literature and policies. *Anesth Analg*. 2015;121:810-21.
 13. Chinese Society of Anesthesiology Task Force on Airway Management. Expert recommendations for tracheal intubation in critically ill patients with novel Coronavirus pneumonia (version 1.0). *Chin J Anesthesiol*. 2020; 40 [Epub ahead of print, Chinese only].
 14. Canelli R, Connor CW, Gonzalez M, et al. Barrier enclosures during endotracheal intubation. *N Engl J Med*. 2020. DOI: 10.1056/NEJMc2007589.
 15. Kamer E, Colak T. What to do when a patient infected with COVID-19 needs an operation: A Pre-surgery, Peri-surgery and Post-surgery guide. *Turk J Colorectal Dis*. 2020;30:1-8.

-
16. Gallo G, Torre ML, Pietroletti R, et al. Italian society of colorectal surgery recommendations for good clinical practice in colorectal surgery during the novel coronavirus pandemic. *TechColoproctol.* 2020. DOI: 10.1007/s10151-020-02209-6.
17. Li Y, Huang X, Yu IT, Wong TW, et al. Role of air distribution in SARS transmission during the largest nosocomial outbreak in Hong Kong. *Indoor Air.* 2005;15:83-95.
-

Key words: Perioperative Care, COVID-19, SARS-CoV2 Transmission

Author Disclosures:

Authors Rashid A, Nazir S, Junaid S, Mir I and Zaiem M have no conflicts of interest or financial ties to disclose.

Corresponding author:

Dr Arshad Rashid

Department of Surgery,

Government Medical College, Srinagar, Kashmir – 190010

Phone: +917838194782

E mail: arsh002@gmail.com