

# Emergency tracheostomy protocols in Coltea Clinical Hospital in patients with SARS-CoV-2 infection

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## ABSTRACT



Since the outbreak of the COVID-19 pandemic in December 2019 there has been an array have studies regarding otolaryngologist and head and neck surgeons considering the exceptionally high risk of exposure. The purpose of this article is to evaluate the current practice in an oncology ENT Department, which ensures health care services for upper aero digestive tract cancer patients. It is of outmost importance that all the health care providers are aware of good clinical practice recommendations and training, according to the current guidelines that needs to be performed as often as possible, so that the implementation of the institution specific guidelines to be optimal. Performing a tracheostomy for an ENT emergency in a patient with suspected or confirmed COVID-19 disease requires preparation from the health care provider so, after reviewing the international literature, we have elaborated a protocol and guidelines in Coltea Clinical Hospital to ensure the possibility of performing emergency surgical interventions for oncology patients. Testing for SARS-CoV-2 is mandatory prior to surgery since opening the trachea and operating on the upper respiratory tract leads to aerosol particles that can infect the surrounding environment and health care providers. Limitations are predictable as long as health care systems are being under tremendous pressure from the general condition and by patients with life threatening disease.

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## Introduction

What turned into a world pandemic was first started with some few cases in rural environment in China. This new type of coronavirus 2 (SARS-CoV-2) is causing what is known to be COVID-19 disease. As data shows, this new type of coronavirus is not as deadly as the previous outbreaks starting from 2003, SARS and MERS viruses, and is considered easily transmitted. Incubation period of SARS-CoV-2 has been calculated to be around four days, although there might be variations, with the onset of symptoms in an insidious manner [1]. The transmission of the virus is a very important aspect to consider due to the fact that the relatively asymptomatic individuals might be

carriers of the virus and thus the pandemic has an exponential growth and there are significant difficulties to limit it [2].

The manifestation of the virus can be from asymptomatic to severe cases which require ICU admission. Symptoms range from mild flu like symptoms, with constant progression towards fever, cough, the loss of smell, the loss of taste, and more recent findings show that it can have a crucial impact on the cardiovascular system [3]. The admission rate in the intensive care unit is presumably considered when the patients need respiratory support. This happens in approximately 20 to 30% of COVID-19 patients [3]. The wide transmission in community and the potentially severe cases that can arise

from patients contracting the disease led to great challenge and pressure on healthcare systems around the world. Since this is a new disease which turned into a pandemic, newer protocols to diagnose and treat the patient needed to be developed. Around the world, health organizations, Disease Control and Prevention Center (CDC), World Health Organization (WHO), health care societies in every specialty, hospitals and individual practice, started a timely consuming and against the clock process to develop and update protocols according to the characteristics of the COVID-19 disease.

The main problem regarding the spread of COVID-19 disease is that the most exposure is through aerosol and fine droplets, being expressed by the carriers with or without symptoms and infecting the surrounding individuals. It is not only a problem for the society in its' daily activities but it is also a problem for the health care providers. Taking into consideration that aerosol generating upper airway procedures including the upper digestive tract are the most dangerous maneuvers for transmitting the disease, we need to establish the medical specialties that are most exposed to potentially contracting the disease. Specialties like anesthesiology due to the need of intubation, ENT due to the specific examination of the upper aero digestive tract end aerosol generating maneuvers, pneumology due to the extent of the disease towards the lungs, gastroenterology due to the upper digestive tract endoscopy and emergency medicine are most likely to be more prone to be exposed and to be contaminated with SARS-CoV-2 [4].

Since the outbreak of the pandemic in December 2019 there has been an array have studies regarding otolaryngologist and head and neck surgeons considering the exceptionally high risk of exposure [5-7]. This happens not only when EMT specialists are giving medical examination but also when performing emergency surgical procedures on the upper arrow digestive tract. From this standpoint we need to consider endoscopic maneuvers of the nasal cavities and the oral cavity and emergency surgery such as tracheostomy or for in body extraction. Not only performing a tracheostomy is a procedure at risk but also taking care of a patient with tracheostomy implies high risk for the ENT specialist.

This is why there is a constant need to develop and improve present protocols regarding indications for the peri-operative precautions that need to be taken when talking about a suspect case of COVID-19 disease and without a doubt when dealing with a confirmed COVID-19 patient.

The purpose of this article is to evaluate the current practice in an oncology ENT Department which ensures health care services for upper aero digestive tract cancer patients. It is of outmost importance that all the health care providers are aware of good clinical practice recommendations and training according to the current

guidelines needs to be performed as often as possible so that the implementation of the institution specific guidelines is optimal.

## Materials and Methods

Performing a tracheostomy for an ENT emergency in a patient with suspected or confirmed COVID-19 disease requires preparation from the health care provider. This requires certain protocols and training for health care workers. In Colțea Clinical Hospital we have elaborated a protocol and guidelines to ensure the possibility of performing emergency surgical interventions for oncology patients after reviewing the international literature.

We identified more than 10 tracheostomy guidelines available either on PubMed, ENT international societies or from other information sources. Although tracheostomy is a common surgical procedure, it rises several problems concerning safety related to patients with upper aero digestive tract impairment in suspected or confirmed COVID-19 patients. Tracheostomy can be performed in an elective setup or as resolve to an emergency. In cases in which tracheostomy had a possible delay, we chose to use other medical resources and not to perform the tracheostomy right away. However, in emergency cases we were required to use specific surgical protocols to ensure safety for the patient and for the surgical team.

The surgical team involved in treating a patient who requires an emergency tracheostomy comprises head the next surgeon, anesthesiologist, nurses and additional OR personnel. This surgical maneuver in case of an emergency needs to have a quick risk assessment for patients with upper aero digestive tract pathology, oncological or non-oncological. The surgical team is guided by the head and neck surgeon with the aid of ICU specialists. The decision for emergency tracheostomy is made by the ENT specialist after evaluating the patient in the emergency room.

## Results

Planning the surgical procedure requires a delay of no longer than few hours, depending on the status of the patient who comes into the emergency room. Timing for the procedure is dictated by the general status of the patient, by morbidities that need to be addressed and the patient stabilized end by the availability of the surgical team. Before planning, all the members of the surgical team need to be aware of the specific COVID-19 protocols and guidelines and need to have been priorly trained. One of the main concerns regarding surgical interventions in suspected or confirmed COVID-19 patients is in relation to the personal protection equipment (PPE). All the members of the surgical team need to know how to correctly use the equipment and ware complete PPE. The PPE equipment should include a face mask that can filter particles of under

30 nanometers this means that standards like N95, KN 95 or FFPE 2 or 3 should be used in these situations. If there is the possibility, the members of the surgical team might use a purified air purifying respirator device (PAPR). Along with the face masks the PPE equipment should also comprise eye goggles, transparent full-face visor, gown or full body suit N double gloves [8-11]. The PPE equipment should be readily available in the operating room where the surgical procedure for the COVID-19 suspicion or confirmed patience will take place.

The place in which the emergency tracheostomy is going to be performed should ensure negative pressure for ventilation or an isolation room or an operating theater with an openable outside window. If the COVID-19 operation theater is not available at the moment of the emergency regular operating room should be used, however, laminar flow of air should be turned off and doors to the operating room should be closed during the entire procedure. The COVID-19 operating room should have well specified changing room for the medical team. In some cases, the biological status of the patient and the presenting pathology with upper respiratory tract obstruction requires oxygen administration and the patient to be placed for stabilization in the emergency room. In such cases the patient can be operated on in the emergency room with all the PPE equipment requirements in order to decrease the risk of contamination for the personnel when disconnecting the patient from air circuits during transfer. If the procedure needs to be performed in an operating room disregarding the risk of disconnecting the patient from manual ventilation extensive care should be taken when transporting the patient to the operating theatre. A particular member of the team should ensure that the patient is safely connected to the facial mask and the air circuit providing oxygen to the patient is in optimal condition along with checking the status of the patient up until arriving in the operating theatre. Prior to transporting the patient into the operating theater or the beginning of surgical procedure swab tests should be used to take samples from the rhinopharynx and the oral cavity for PCR testing of SARS-CoV-2.

## Discussions

### *Emergency tracheostomy*

Performing the emergency tracheostomy requires verification of the PPE equipment for the entire surgical team COVID-19. It is mandatory to check the surgical kit the presence of cuffed unfinished rated tracheal tubes which need to be available in different sizes, to check the ventilation equipment with HME or HEPA filters and auxiliary equipment needed for the surgical procedure. The surgical team leader needs to write down all the medical data concerning the patient prior to the emergency tracheostomy. Check-up is complete when all the members of the surgical

team COVID-19 are ready for the procedure. Confirmation is needed regarding diagnosis and surgical indication and the patient is required to sign the informed consent for surgery and general anesthesia.

Prior to beginning the surgical intervention all the members of the surgical team need to have a briefing in which planning should be thorough and case particularity needs to be discussed. The anesthesiologist needs to confirm if control paralysis for the patient during surgical intervention is possible. The chief nurse for the COVID-19 operating theater will check the correct dressing with PPE equipment for all the members of the surgical team. It is of utmost importance that the use of electrical cautery is prohibited during surgery and ligation is the only way to ensure hemostasis.

Performing emergency tracheostomy is possible either under general anesthesia or if intubation is impossible the maneuver will be performed under local anesthesia. If emergency tracheostomy is performed under general anesthesia the surgeon will enter the operating theatre after the patient is under general anesthesia. Anesthesiologists should have the possibility of video bronchoscopy when performing intubation for a suspected or confirmed COVID-19 patient. Intubation should be performed by the most experienced anesthesiologist or if such is the case by the uncle anesthesiologist. The surgeon is required to perform the emergency tracheostomy steps normally until the opening of the anterior wall of the trachea. When exposing the anterior wall of the trachea the surgeon will communicate with the anesthesiologist so that the cuffed non fenestrated tracheal tube is available and already connected to the mechanical ventilators' circuits. This is the case of both emergency tracheostomy under local and general anesthesia.

However, the difference in between tracheostomy under local and general anesthesia is that in the case of local anesthesia the patient needs to be paralyzed before the opening of the tracheal wall. After the anesthesiologist paralyzes the patient passive expiration should be allowed until there is no flow of air through the trachea. Just then the surgeon can create the tracheostomy and insert the cuffed non fenestrated tracheal tube attached to the ventilators' air circuits. The cuff needs to be overinflated so that the trachea is completely sealed. Tracheostomy tube will be secured by suturing it to the skin and after that decontamination of the wound and appropriate dressing will be insured. It is important that the tracheostomy orifice is of larger size than usual so that the cartilages of the trachea do not damage the cuff of the tracheal tube.

In the case of emergency tracheostomy performed under general anesthesia after exposing the interior wall of the trachea the patient will be paralyzed by the anesthesiologist and only after the last passive movement of air through the trachea the incubation tube will be slowly

retracted towards the cranial end of the trachea and the non-fenestrated cuffed tracheal tube will be inserted into the trachea. All the other steps after are according to the ones already described.

#### Confirmation

Correct positioning of the tracheal tube and the functioning respiratory circuit should be assessed by the anesthesiologist using either a stethoscope or end-tidal CO<sub>2</sub> level.

#### Finalizing the emergency tracheostomy

After appropriate fixation of the tracheostomy tube end correct positioning confirmation the patient will remain connected to the mechanical ventilator until the result for the test is available in COVID-19 suspected patients or until two negative SARS-CoV-2 PCR tests.

Even though the COVID-19 pandemic creates a health care mayhem there are patients that need to benefit from surgical interventions for pathology that are life threatening. This is the case of emergency medicine with surgical resolve and oncology cases. More to this, oncology head and neck emergencies such as emergency tracheostomy have a high impact on the patients' survival as well as being a very high-risk maneuver for contaminating health care providers. The need for better understanding of the transmission pattern of the SARS-CoV-2 led to the development of guidelines regarding surgery in the upper respiratory tract. Acute respiratory insufficiency which needs emergency tracheostomy is a high-risk maneuver with the potential of infecting surgical team members. As more data will be available guidelines used by ENT specialists and head the neck surgeons might suffer updates in terms of safety and efficacy. Our protocol for emergency tracheostomy has already suffered two revisions. Limitations are predictable as long as health care systems are being under tremendous pressure from the general condition and by patients with life threatening disease.

## Conclusions

Emergency tracheostomy is a surgical procedure which cannot be subject to delay and the indication is set after properly examining the patient. COVID-19 suspected or confirmed patients need to follow particular protocol to ensure the possibility of surgery making end safety for the surgical team. Testing for SARS-CoV-2 is mandatory prior to surgery since opening the trachea and operating on the upper respiratory tract leads to aerosol particles that can infect the surrounding environment and health care providers. The surgical team needs to be well trained for performing emergency tracheostomy, because exposure to aerosol needs to be minimized and the time needed for completing surgery needs to be minimal. Dedicated operating rooms need to be prepared in hospitals which

have a head and neck surgery department. We found that strict use of PPE equipment and good knowledge of emergency tracheostomy protocols for COVID-19 patients are able to decrease the risk of contamination for members of the surgical team. It is our concern that head and neck surgeons should be aware of the risks involving emergency tracheostomy in a COVID-19 patient and should act according to local or international protocols following safety regulations.

## References

1. Guan WJ, Ni ZY, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med.* 2020;382(18):1708-1720. doi:10.1056/NEJMoa2002032
2. Lai CC, Liu YH, Wang CY, et al. Asymptomatic carrier state, acute respiratory disease, and pneumonia due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): Facts and myths [published online ahead of print, 2020 Mar 4]. *J Microbiol Immunol Infect.* 2020; doi:10.1016/j.jmii.2020.02.012
3. Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study [published online ahead of print, 2020 Feb 24] [published correction appears in *Lancet Respir Med.* 2020 Apr;8(4):e26]. *Lancet Respir Med.* 2020; doi:10.1016/S2213-2600(20)30079-5
4. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. *PLoS One.* 2012;7(4):e35797. doi:10.1371/journal.pone.0035797
5. Zara M, Patel MJF-M, MD; Peter H. Hwang, MD; Jayakar V. Nayak, MD, PhD; Robert Dodd, MD, PhD; Hamed Sajjadi, MD; Robert K. Jackler, MD. Precautions for endoscopic transnasal skull base surgery during the COVID-19 pandemic. 2020. <https://neurosurgery.directory/2020/04/03/precautions-for-endoscopic-transnasal-skull-base-surgery-during-the-covid-19-pandemic/>
6. Kowalski LP, Sanabria A, Ridge JA, et al. COVID-19 pandemic: Effects and evidence-based recommendations for otolaryngology and head and neck surgery practice [published online ahead of print, 2020 Apr 9]. *Head Neck.* 2020;10.1002/hed.26164. doi:10.1002/hed.26164
7. Otolaryngologists and the COVID-19 Pandemic. American Academy of Otolaryngology - Head and Neck Surgery. 2020. <https://www.entnet.org/content/otolaryngologists-and-covid-19-pandemic>
8. Kong DoAaIC-TCUoH. Infographic for Principles of Airway Management in COVID-19. 2020. <https://www.aic.cuhk.edu.hk/covid19/>

9. Laura Harrison JR, Stuart Winter. Guidance for surgical tracheostomy and tracheostomy tube change during the COVID-19 Pandemic. ENT UK. 2020. <https://www.entuk.org/tracheostomy-guidance-during-covid-19-pandemic>
10. Liana Zucco NL, Desire Ketchandji, Mike Aziz, Satya Krishna Ramachandran. Perioperative Considerations for the 2019 Novel Coronavirus (COVID-19) Anesthesiology Patient Safety Foundation. 2020. <https://www.apsf.org/news-updates/perioperative-considerations-for-the-2019-novel-coronavirus-covid-19/>
11. Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. Directives concrètes à l'intention des équipes de soins intensifs et d'anesthésiologie prenant soin de patients atteints du coronavirus 2019-nCoV. *Can J Anaesth.* 2020; 67(5): 568-576. doi:10.1007/s12630-020-01591-x