

# Tracheostomy in suspected or confirmed cases of COVID-19

## Traqueostomia em casos suspeitos ou confirmados de COVID-19

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### ABSTRACT

The focus of this review is to present the consensus of head and neck surgery experts on tracheostomy during COVID-19 outbreak. Considerations about the ideal time to perform, surgical team, appropriate location, technique, and the necessary surgical equipment of the procedure were described to minimize risks of contamination of health care workers and hospital facilities.

**Keywords:** Tracheostomy; Health care facilities; Manpower and services; Surgical equipment; Biological contamination.

### RESUMO

O foco desta revisão é apresentar o consenso de especialistas em cirurgia de cabeça e pescoço sobre traqueostomia durante o surto de COVID-19. Considerações sobre o tempo ideal para a realização, equipe cirúrgica, localização, técnica e o equipamento cirúrgico necessário do procedimento foram descritas para minimizar os riscos de contaminação dos profissionais de saúde e instalações hospitalares.

**Descritores:** Traqueostomia; Serviços de saúde; Mão de obra e serviços; Equipamento cirúrgico; Contaminação biológica.

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## INTRODUCTION

According to the WHO Coronavirus disease 2019 (COVID-19) Situation Report- 87, almost 2 million people were diagnosed and 130.000 died of COVID-19 in the world. Brazil is also facing this serious pandemic caused by SARS-CoV-2. Officially, more than 25.1 cases and 1.500 deaths have been registered until April 16, 2020.<sup>[1]</sup>

Around 5% of infected patients with the new coronavirus will need intensive care unit (ICU) care because severe respiratory dysfunction. This condition could lead the patient to respiratory failure with the need for invasive ventilatory support for several days.<sup>[2]</sup> The main reason is that COVID-19 causes diffuse alveolar damage to the hyaline membrane in critically ill patients, where a lot of viral damage is observed in the pulmonary alveolar epithelium and massive blockage of the capillary alveolar gas exchange.<sup>[3]</sup>

Tracheostomy is the most common surgical procedure performed in the ICU. The main classical indications are prolonged intubation, prevention of laryngeal and tracheal stenosis, improving the toilet and aspirations of the trachea and bronchi, and to reducing the gap between the mechanical respirator and the trachea.<sup>[4]</sup> However, in patients infected with SARS-CoV-2 virus, performing a tracheostomy becomes a high-risk procedure because of the risk of contamination of the surgical team and the environment.<sup>[5,6]</sup>

The focus of this review is to present the consensus of head and neck surgery experts on the ideal time to perform (or not) a tracheostomy, the team that should perform the procedure, the location (in the operating room or in the ICU), the appropriate surgical team protection, the technique (percutaneous or open traditional technic), the necessary surgical equipment and the possible need for a cricothyroidotomy.

### Indications and ideal time to perform a tracheostomy

Tracheostomy in patients admitted to the ICU who are under orotracheal intubation and mechanical ventilation is usually indicated between the fourth and the twenty-first intubation day. Most of the times it is done between 10 and 14 days. This indication may vary according to the severity of the disease and critical status of the patient. In critical ill patient, where the mechanical ventilation expectation is for more than 14 days, the tendency is to perform the tracheostomy earlier.<sup>[4]</sup>

Several reports show that the health condition of COVID-19 patients admitted to the ICU, under mechanical ventilation, is extremely severe and the mean time of intubation is of about two weeks.<sup>[2,7,8]</sup> The indication of tracheostomy must be carefully discussed case-by-case between ICU physicians and head and neck surgeons because this procedure

is a high risk one, due to aerosol-generation. In general, there is a trend to avoid tracheostomy. However, for a small proportion of cases, it may be necessary to provide adequate respiratory care. Generally after 21 days. In preparation and during the procedure, all safety measures must be undertaken to mitigate occupational risk for physicians and other healthcare workers. As it is not an emergency indication, it is necessary to ensure that family understand the indication and the risks, and then sign an informed consent.

### The team and the location

A tracheostomy in intubated patients is usually performed in the ICU. The ideal team consists of a surgeon and assistant with experience in tracheostomy in the ICU environment (head and neck surgeon, thoracic surgeon, or general surgeon). An intensivist must be present monitoring and acting on the infusion or suspension of drugs, decrease or increase gases, as well as helping to extubate the patient. It is necessary also have a scrub nurse, a physical therapist, a nurse and a nurse technician to deliver the necessary materials.<sup>[4]</sup>

The ideal environment to perform a tracheostomy in a COVID-19, like other patients with infection and acute respiratory syndrome, is a room with negative pressure or an isolated room.<sup>[9,10]</sup> However, it is not available in most Brazilian hospitals, except in the operating room. Whenever these conditions are not available, consider performing the procedure at the bedside, with closed doors, turning off the laminar flow (if present). Many surgeons prefer to perform the tracheostomy in the operating room. The decision depends on each hospital infrastructure and must be carefully discussed among all the team. A special consideration is the safety of the patients' transportation to the operating room. There are situations that the procedure must be performed at an operating room: morbid obese patients, large thyroid goiter or other neck mass or other anticipated technically difficult cases. Aiming to protect human resources, the team must be reduced to the essential staff (surgeon, assistant, anesthesiologist and a nurse technician).

### Preparation and dressing for surgical team protection

Personal protective equipment (PPE) is essential to prevent contamination of all healthcare workers before, during and after a tracheostomy. All team must use surgical cap, masks type N95 or PPF2 (PPF3, if available); goggles or face shield; disposable long-sleeved waterproof apron, two pairs of disposable gloves; and shoe covers.<sup>[6,10]</sup>

### Surgical technique

The choice of the technique to be used (percutaneous or open traditional) depends on the team's experience. There is no scientific evidence that percutaneous tracheostomy is safer and generates less aerosols. The current recommendation for

percutaneous tracheostomy is to perform an ultrasound-guided procedure because it is prudent to avoid bronchoscopy. Ultrasound is a safe method to assist positioning the tracheostomy cannula inside the trachea.<sup>[11]</sup>

Regarding surgical equipment and surgical technique, the tracheostomy cannula must be cuffed and not fenestrated. Reserve at least 2 other cannulas of different sizes. The most experienced surgeon must perform the procedure. Reduce the use of electrocautery as much as possible. Before opening the trachea, ask the intensivist/anesthesiologist to administrate intravenous lidocaine to reduce the risk of coughing. The endotracheal tube must be pushed beyond the chosen site for tracheostomy to avoid aerosol spread. Pre-oxygenate and be sure that the patient endures a period of apnea required for cannula replacement. Ask the intensivist/anesthesiologist to hold mechanical ventilation (if possible), made the tracheostomy window, ask the intensivist/anesthesiologist to pull the tracheal tube and then quickly introduce the cannula, secure it in position, place a heat and moisture exchanger (HME) device with viral filter aiming to reduce virus shedding, hyperinflate the cuff, ensure that there is no leak and finally connect the patient to ventilator. The orotracheal tube must be removed and a mask must be placed on patient to reduce dispersion if the patient cough. Seal as much as possible with the space between the skin incision and the tracheostomy tube. Suture the tracheostomy cannula to the skin.<sup>[4]</sup> All surgical instruments and disposables must be collected in sealed bags. All equipment and environment surfaces must be properly disinfected.

### Cricothyroidotomy

It is rare, but in some cases, an experienced intensivist or anesthesiologist will not be able to perform orotracheal intubation. Therefore, cricothyroidotomy may be indicated. However, the surgical team that will perform the procedure should not perform it as an extreme emergency surgical act. The patient must be oxygenated; the intensivist or anesthesiologist can use a laryngeal mask. The protection measures must be the same described before. The cricothyroidotomy is performed according to the established technique and the incision must be sutured tightly so that no aerosols will escape.<sup>[4]</sup> After performing the cricothyroidotomy, it must be replaced immediately by a tracheostomy following all the safety protocols described above.

### Postoperative care

The healthcare workers that deal with the patient must wear complete PPE. The cannula cuff must remain inflated and it is mandatory to check for leaks periodically. The circuit must not be disconnected and only closed in line suctioning should be used. The change of cannula must not be done until COVID-19 is cured.

## CONCLUSION

COVID-19 is an extremely contagious disease and respiratory complications are associated with high mortality rates. The performance of tracheostomy in critically ill patients admitted to an ICU, under mechanical ventilation, is a high-risk surgical procedure. Therefore, tracheostomy should be avoided but if it is unavoidable, a series of protective measures must be implemented aiming of reduce the risk of contamination for the surgical team and the environment.

These recommendations on tracheostomy during COVID-19 pandemic in Brazil were established by a committee of respected head and neck surgeons, with extensive experience in tracheostomies, leaders who work in some of the largest and most respected Brazilian institutions.

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