

Guidelines for Tracheotomy in Patients During COVID-19 Pandemic

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Version 3

BACKGROUND:

Our understanding of the progression and natural history of COVID-19 remains incomplete. These guidelines pertain to tracheotomies during the current era, regardless of COVID-19 status.

Under ordinary circumstances, early tracheotomies permit decreased sedation needs, improved pulmonary toilet, improved mobility, shorter durations of mechanical ventilation, and shorter ICU stays. However, tracheotomies among COVID-positive patients pose significant risk to the surgery team - and later to the nursing team - because of the exceptionally high concentration of the virus in the mucosa of the upper aerodigestive tract. It is important to weigh the overall hazards of a tracheotomy, including to the healthcare workers, versus the benefits in terms of weaning patients from mechanical support and liberating resources such as ICU space and ventilators. For patients with COVID-19, tracheotomies should be delayed at least 2-3 weeks to allow the clinical course to manifest and the virus to possibly clear from the upper airway. The operation should be offered to those patients who have a reasonably good likelihood of survival and good prospects of weaning from the ventilator.

Candidates for tracheotomies should be hemodynamically stable off vasopressor support. Patients should also be stable on volume control or pressure support ventilation with PEEP \leq 10cmH₂O and FiO₂ \leq 50%, with improving respiratory parameters. The patient must tolerate the loss of PEEP and de-recruitment that occurs when the trachea is opened. This can be tested by performing a 60-second apnea trial. The patient should maintain normal hemodynamics, and oxygen saturation should remain above 80% during that interval.

Testing among patients with previously established COVID-19 or a high probability of COVID-19:

No additional testing is required in a patient with a diagnosis of COVID-19 within a three month period of their initial diagnosis as long as it has been > 20 days from the time of initial symptom onset and the patient has had symptom improvement and is afebrile off antipyretics for 24 hours. For patients who are immunocompromised *and* there are diverging opinions, an Infectious Disease consult may be obtained. For patients with a COVID-19 diagnosis > 90 days from the date of planned tracheotomy, follow procedure for testing among patients without a diagnosis of COVID-19 (see below).

Testing among patients without a diagnosis of COVID-19:

Some patients with respiratory failure will have had a negative COVID-19 test upon admission. When there is a compelling alternate explanation for their respiratory failure (e.g., heart failure, bacterial pneumonia, trauma, etc.), and the probability of COVID is thought to be low, these patients require a single tracheal aspirate for COVID-19 testing prior to the tracheotomy. This test should be obtained 3-4 days before the tracheotomy to allow time for outside laboratory to process. **During the interval between the test and operation, the patient retains a "non-COVID status" and does not require transfer to a COVID unit.** (This measure has been approved by the Infectious Disease team). The surgeon and intensivist will determine the value of repeating the COVID-19 test if the results exceed the above time frame or if a positive test is thought to be clinically irrelevant (e.g., sensitive PCR test detecting residual virus in endotracheal tube debris). If there are conflicting data or diverging opinions, an Infectious Disease consult may be obtained.

When the surgery team (either General Surgery or Otorhinolaryngology) decides to pursue a tracheotomy, regardless of the COVID status, the team will comply with the Aerodigestive Surgery Protocol. Of note, there is significant risk associated with accidental contact with contaminated PPE or drapes after the operation has been completed, particularly during the doffing of PPE and cleaning up. Staff should be especially attentive to not touching or shaking out potentially contaminated protective materials. The act of doffing may require blindly

reaching for parts of one's PPE as it is removed. Staff should observe each other while donning and doffing PPE to identify breaks in technique.

TECHNICAL ASPECTS:

Tracheostomy should be performed in an ICU, if possible, to minimize airway circuit disconnections, avoid transportation of patients, and prevent exposure of other patients and staff. Full BMC-standard PPE should be used by all providers in the room during the operation. This includes N-95 and Full-Face Shield, OR N-95 and ventilator hood, OR PAPR, along with standard sterile surgical gown and double gloves. Personnel in the room should be limited to those who are highly experienced with the operation, and there should be no shift changes during the tracheotomy.

Team members in the room should be limited to the anesthetist, attending surgeon and assistant, scrub person and the patient's ICU nurse.

An open tracheostomy or percutaneous dilational technique (PDT) can be utilized, based upon the surgeon's preference and experience. The Modified Percutaneous Technique, where bronchoscopic guidance is not utilized, should offer the shortest open airway time with the lowest potential for aerosolization. Key steps and considerations for open and PDT are detailed below. Use of bronchoscopy appears to be safe if necessary to confirm appropriate wire placement during PDT provided ventilation is paused while the scope is in place.

Surgical Field Droplet Drape

A clear plastic droplet drape can be used to minimize the spray of airway secretions during manipulation of the ETT and tracheostomy. The Omni-Retractor set or other draping system can be used.

Omni-Retractor Set and Drape:



EQUIPMENT:

- Portex DIC or Shiley SCT Tracheostomy Appliances [Size 6/7/8]
- Spare Endotracheal Tube and Stylet
- Glide-Scope
- Ciaglia Blue Rhino Percutaneous Tracheostomy Kit
- Open Tracheostomy Instrument Tray
- Headlamps x 2
- Electrocautery Unit – If desired
- Electrocautery Pencil with Smoke Evacuator – If using cautery
- Suction Tubing x 2
- #2-0 Prolene Suture
- Velcro Tracheostomy Tube Holder/Collar
- Replacement HME and Viral Filters

Modified Percutaneous Approach

1. Initiate/ensure sedation & paralysis.
2. Verify the ventilator has waveform end-tidal capnography or that a colorimetric CO₂ detector is available.
3. Remove OG tube and anything else in oropharynx other than the endotracheal tube (ETT). Suction the oropharynx and hypopharynx and suction the ETT via the in-line suction device.
4. Position patient with head and neck midline. Use shoulder roll to extend the neck.
5. Cleanse anterior neck with ChloroPrep
6. If desired, position the droplet shield draping system over the head and torso. *(See details above)*
7. Make a 2-cm vertical incision centered on the 2nd tracheal ring. *(Ultrasound can be used to help define anatomy and localize the rings)*
8. Dissect the superficial soft tissue to palpate and visualize the tracheal rings.
9. Using the Glide-scope (not the bronchoscope), visualize the hypopharynx and retract the endotracheal tube until the balloon is at the vocal cords. *(This is typically 15cm from the incisors in women and 17cm in men.)*
10. PAUSE VENTILATION AND SUCTION THE AIRWAY
11. Insert the introducer needle between the 1st and 2nd tracheal rings and advance until air is aspirated.
12. Advance the guidewire through the needle into the airway. *(Note: Orienting the bevel towards the feet and angling the needle tip slightly towards the feet will facilitate appropriate wire placement.)* Remove the needle.
13. Roll the ETT to ensure the wire has not passed through the ETT wall, balloon, or Murphy eye (lateral opening on ETT tip).
14. Dilate the initial access site with the 14-Fr dilator over the guidewire *(Note: Twisting the dilator as you advance and retract will facilitate dilation)*
15. Advance the Blue Rhino and white guide catheter over the guidewire.
 - a. Ensure the Blue Rhino is seated on the flange of the guide catheter.
 - b. Ensure the solder mark on the guidewire is visible at the proximal end of the guide catheter.
16. Dilate the tract to the skin marker on the Blue Rhino.
17. Remove the Blue Rhino but leave the guidewire and guide catheter in place in the airway.
18. Advance the tracheotomy appliance with the obturator over the guidewire.
 - a. Ensure the blue obturator is seated on the flange of the guide catheter.
 - b. Ensure the solder mark on the guidewire is visible at the proximal end of the guide catheter.
19. Pass the tracheostomy appliance and obturator over the wire into the airway and stabilize the flange at the skin.
20. Remove the obturator and guidewire, inflate the tracheostomy appliance balloon.
21. Connect the ventilator to the tracheostomy appliance
22. RESUME VENTILATION
23. Verify good return of tidal volumes and capnography waveform.
24. Secure the tracheostomy appliance using the tracheostomy collar tie and sutures through the flange to the skin of the neck.

Open Approach

1. Initiate/ensure sedation & paralysis.
2. Verify the ventilator has waveform end-tidal capnography or that a colorimetric CO₂ detector is available.
3. Remove OG/NG tube and anything else in oropharynx besides ETT. Suction the oropharynx and hypopharynx and suction the ETT via the in-line suction device.
4. Position patient with head and neck midline. Use shoulder roll to extend neck.
5. Cleanse anterior neck with ChloroPrep
6. If desired, position the droplet shield draping system over the head and torso. (*See details above*)
7. Incise the neck at the level of the 2nd tracheal ring.
8. Dissect the superficial soft tissue to visualize the anterior trachea.
9. PAUSE VENTILATION AND SUCTION THE AIRWAY.
10. Incise the trachea taking care to fashion a tracheotomy that is large enough to accept the chosen tracheostomy appliance. Use suction in the operative field to help control the aerosolization of droplets from the dissection.
11. Withdraw the ETT to just above the tracheotomy.
12. Pass the tracheostomy appliance into the airway and stabilize the flange at the skin.
13. Inflate the Tracheostomy Balloon and connect the ventilator to the tracheostomy appliance
14. RESUME VENTILATION
15. Verify good tidal volumes and capnography waveform.
16. Secure the tracheostomy appliance using the tracheostomy collar tie and sutures through the flange to the skin of the neck.

Tracheal Stay Sutures, Bjork Flaps, or any other technique that creates a large anterior tracheal wall opening should be avoided. These approaches could allow air leakage around the tracheostomy appliance and risk greater aerosolization.

The tracheostomy appliance should be secured using both skin sutures and the Velcro tracheotomy collar to prevent dislodgements.