Recommendations for Elective Tracheostomy in COVID+ Patients

General considerations

1. Decision-making in tracheostomy should take into consideration general principles for managing COVID positive patients, including limiting exposure to personnel, preventing transmission of disease, and preserving resources during resource scarcity; and the surgical and ICU team's discretion as well as institutional policy.
2. Avoid tracheostomy in COVID-19 positive or suspected patients during periods of respiratory instability or heightened ventilator dependence.

Timing

1. Tracheostomy can be considered in patients with stable pulmonary status but should not take place sooner than 3 weeks from intubation
2. Early tracheostomy should be considered on a case-by-case basis and in the context of additional extenuating circumstances.

Indications

1. Elective tracheostomy to be performed only if both conditions are met:
    a. Patients demonstrate disease stability or improvement
        i. Ventilatory settings FiO2 ≤50% and PEEP≤8 cm H20
        ii. If on vasopressors, norepinephrine ≤0.1mcg/kg/min, or vasopressin ≤0.04 U/min, or phenylephrine ≤1mcg/kg/min
        iii. No inotropic or cardiac mechanical support
        iv. Not on ECMO
        v. Need for CVVHD is acceptable if other requirements are met
    b. If, by determination of ICU, surgical, and anesthesia teams, one or more of the following conditions are met:
        i. Tracheostomy will have a high likelihood of shortening overall duration of mechanical ventilation
        ii. Significantly improve ICU delirium
        iii. Limit long-term risk of laryngotracheal stenosis
        iv. Significantly improve patient comfort
2. In patients with no evidence of sustained, reproducible, purposeful, or voluntary behavioral responses to visual, auditory, tactile, or noxious stimuli at 3 weeks, brain MR can be considered to further inform the decision to pursue tracheostomy.
3. Given inability to currently place mechanically ventilated COVID-19 patients in long-term care facilities, elective tracheostomy should not be considered for the sole purpose of patient placement at this time.

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4. Patients not meeting the above guidelines should only be considered on a case-by-case basis if additional extenuating circumstances

Location

1. To minimize additional risk of transfer and disconnection/reconnection of the ventilatory circuit, tracheostomy should be performed at the bedside in the ICU, preferably in a negative-pressure room.

Procedure Type

1. Open tracheostomy is preferable to percutaneous tracheostomy due to overall decreased aerosolization risk

Procedure Personnel

1. Open tracheostomy for COVID patients should be performed only by providers with significant experience and comfort level with tracheostomy to keep airway exposure and aerosolization to an absolute minimum.
2. Limit the number of providers participating in tracheostomy procedure and post-procedure management.

Technique

1. Adhere to strict donning and doffing procedures based on institutional protocol.
    - A minimum of N95 mask, surgical cap, eye protection, surgical gown, and gloves should be worn.
    - PAPR may be considered if available for at-risk surgeons and staff but may limit use of a headlight if needed
2. Maximally pre-oxygenate patient
3. Perform entire tracheostomy procedure under complete paralysis
4. If using monopolar, an appropriate surgical smoke evacuator should be used
5. Advance ETT and cuff safely below the intended tracheotomy site and hold respirations while incising trachea.
    - In patients with limited pulmonary reserve, after the initial tracheal incision, the cuff may be reinflated to continue ventilation below the tracheotomy site while fashioning a Bjork flap or placing tracheal stay sutures
6. Minimize tracheal suctioning during procedure to reduce aerosolization.
7. Choose cuffed, non-fenestrated tracheostomy tube.
8. Maintain cuff appropriately inflated post-operatively and attempt to avoid cuff leaks.
9. Avoid circuit disconnections and suction via closed circuit.
10. Place a heat moister exchanger (HME) with viral filter or a ventilator filter once the tracheostomy tube is disconnected from mechanical ventilation.
11. Delay routine post-operative tracheostomy tube changes until COVID-19 testing is negative.

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Rationale for Recommendations

General considerations

The goal of these recommendations is to establish guidelines for elective tracheostomy that focus on patient and health care team well-being during the COVID-19 pandemic with minimization of risk, viral exposure, and personal protective equipment (PPE) depletion. These recommendations and rationale are meant to provide background, considerations, and guidelines based on an evolving body of literature and front-line information from this stage in the pandemic. These recommendations may require individualization based on staff, resources, and patient-specific factors.

Timing

1. Considerations in favor of earlier tracheostomy
    a. The ability to wean sedation can reduce sedation-related delirium and improve patient comfort.
    b. The potential to decrease duration of mechanical ventilation and shorten ICU stays may be of significance in the setting of ventilator or ICU bed shortages.[1,2]
    c. There is no clear anticipated timing for viral clearance, and critically ill patients may have significantly longer positive testing. This may last for weeks, such that waiting for tracheostomy until viral clearance may not be reasonable.[3]
2. Considerations in favor of later tracheostomy
    a. The benefits of performing early tracheostomy in critically ill COVID-19 patients are unclear from available data. Based on the SARS-1 outbreak with a similar coronavirus, the need for mechanical ventilation was associated with a 46% mortality.[4] Early reports from China suggest mortality rate for mechanical ventilation in the setting of COVID-19 may be even higher.[3] For these reasons, performing later tracheostomy may limit the number of procedures performed on patients with limited life expectancy and decrease added unnecessary risk to physicians and staff.
    b. Post-intubation laryngotracheal stenosis is a known risk of prolonged intubation, but has not been shown to be significantly reduced in patients treated with early tracheostomy.[5]
    c. Incidence of ventilator-associated pneumonia is not clearly improved with early tracheostomy.[1,6]
    d. In patients who recover and the ARDS resolves, there is generally not a need for long term positive pressure ventilation

Indications

1. In both the SARS-1 and the current COVID-19 pandemics, time from intubation until death may be >2 weeks, suggesting a potentially limited benefit of performing early tracheostomy, as well as a limited benefit of performing later tracheostomy in patients whose clinical status is worsening.[3,7]
2. COVID pulmonary pathology is typically an interstitial pneumonitis pattern with less pulmonary secretions, and therefore pulmonary toilet is not a major driver of tracheostomy as it may be in other patients.

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3. Given that a subset of COVID-19 patients present with an inflammatory and thrombotic phenotype, patients who are clinically non-responsive at 3 weeks may have extensive underlying neurological injury from multiple strokes and brain MR may aid in prognostication and physician and family decision-making.

Location

1. Bedside tracheostomy in the ICU avoids additional transfer and exposure risk. In most instances during the SARS-1 outbreak, open tracheostomy was performed in this manner with good outcomes.[8-11]
2. To further decrease risk, tracheostomy should be performed in negative-pressure rooms whenever possible.

Procedure Type

1. Percutaneous tracheostomy may require more extensive airway manipulation including bronchoscopy and/or serial dilations as well as potentially repeated disconnection and reconnection from the ventilatory circuit.
2. Open tracheostomy performed by experienced providers incurs limited airway exposure under a short period of apnea.

Procedure Personnel

1. Bedside tracheostomy in COVID-19 patients must be meticulously planned and performed. Considerations include limited space, suboptimal positioning, and movement and organization of essential instrumentation.

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