Critical Care Explorations

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Tracheostomy for Coronavirus Disease 2019 Patients: Maintaining the Standard of Care

Objectives: To respond to the new recommendations for delaying tracheostomy for coronavirus disease 2019 patients to day 21 post-intubation to ensure viral clearance.

Design: Prospective observational cohort from April 1, 2020, to April 30, 2020, with 60 days follow-up.

Setting: Academic medical center with nine adult ICUs dedicated to caring for coronavirus disease 2019 patients requiring mechanical ventilation.

Patients: Mechanically ventilated patients with coronavirus disease 2019 pneumonia requiring tracheostomy for prolonged ventilatory support.

Interventions: Adherence to the standard of care for timing of tracheostomy as deemed necessary by the intensivist without delay and utilizing the existing tracheostomy team in performing the needed procedures within 1 day of the request.

Measurements and Main Results: One hundred eleven patients with coronavirus disease 2019 received tracheostomy in the month of April 2020. Median time to tracheostomy was 11 days. All procedures were performed percutaneously at bedside under bronchoscopic guidance. Sixty-three percent of patients who received tracheostomy either weaned or discharged alive within 60 days of the procedure. Performing tracheostomy on these patients without delay did not lead to coronavirus disease 2019 viral transmission to the tracheostomy team as evident by lack of symptoms and negative antibody testing.

Conclusions: Adherence to standard of care in timing of tracheostomy is safe. Recommending delaying the procedure may lead to harmful consequences from prolonging mechanical ventilation and sedation without apparent benefit.

Key Words: coronavirus disease 2019; timing; tracheostomy

To the Editor:

Tracheostomy is a common procedure performed for ICU patients to replace the translaryngeal intubation when patients need prolonged mechanical intubation or fail short term weaning from ventilator. For many, it is a lifesaving intervention that is the only way for patients to regain their respiratory independence. This is particularly true when critical illness leads to the significant physical deconditioning that necessitates prolonged weaning from mechanical ventilation.

The use of tracheostomy as an alternative to continued translaryngeal intubation offers several advantages. It can improve patient comfort and decrease need for sedation and pain medications; hence, less delirium. Tracheostomy also allows for early mobility, shorter duration of mechanical ventilation, and shorter ICU and hospital stay. In addition, tracheostomy provides better oral hygiene, less injury (dental, laryngeal, and tracheal injury), and easier and safer nursing care. In the event of unsuccessful reintubation due to a difficult airway, the lack of a secure airway that tracheostomy affords, can be lethal.

Despite the many advantages of tracheostomy, there is a lack of consensus on the optimal timing for tracheostomy placement. Timing of tracheostomy placement has been controversial with most defining early tracheostomy as 2–10 days and late tracheostomy 7–14 days from intubation. Of note, no studies have evaluated the effect of delaying tracheostomy to later than 21 days, we consider this time a very late tracheostomy. The benefits of earlier timing include more ventilator-free days (1, 2), shorter sedation duration (3), and shorter ICU length of stay; possible decreased mortality has been demonstrated in a recent meta-analysis (3). In Cochran's review of eight randomized controlled trials, mortality benefit was demonstrated for the early tracheostomy (< 10 d) (4).

With the rapidly expanding coronavirus disease 2019 (COVID-19) pandemic, a sharp rise in patients requiring prolonged mechanical ventilation led to the subsequent increase in need for tracheostomy for these patients. Due to the risk of viral transmission to staff with aerosolizing procedures (arguably the most aerosolizing procedure is during tracheostomy placement), multiple international professional otolaryngology and surgical organizations (5–7) published guidelines recommending delaying tracheostomy placement to after 21 intubation days in order to ensure viral clearance prior to the procedure. In the setting of these well-intended practice guidelines, there has been practice dilemma when intensivists who manage COVID-19 patients identify the need for earlier tracheostomy, and the guidelines recommend a "pause." The impact of delays in performing tracheostomy is well known to intensivists. Undoubtedly, delaying tracheostomy leads to prolonged use of sedatives and analgesics with the subsequent increased risk of delirium (an independent risk for mortality), increasing risk of unplanned extubation and airway emergencies, more prolonged duration of mechanical ventilation, increased ICU stay, delay in mobility with increasing ICU acquired weakness, and increased risk of post intensive care syndrome. Often tracheostomy comes as the only viable solution when weaning from the ventilator requires multi-stepped approach, compared to the all or none approach with extubation. This is often clear, particularly for patients who are deconditioned after prolonged critical illness such as COVID-19 pneumonia with acute respiratory distress syndrome.

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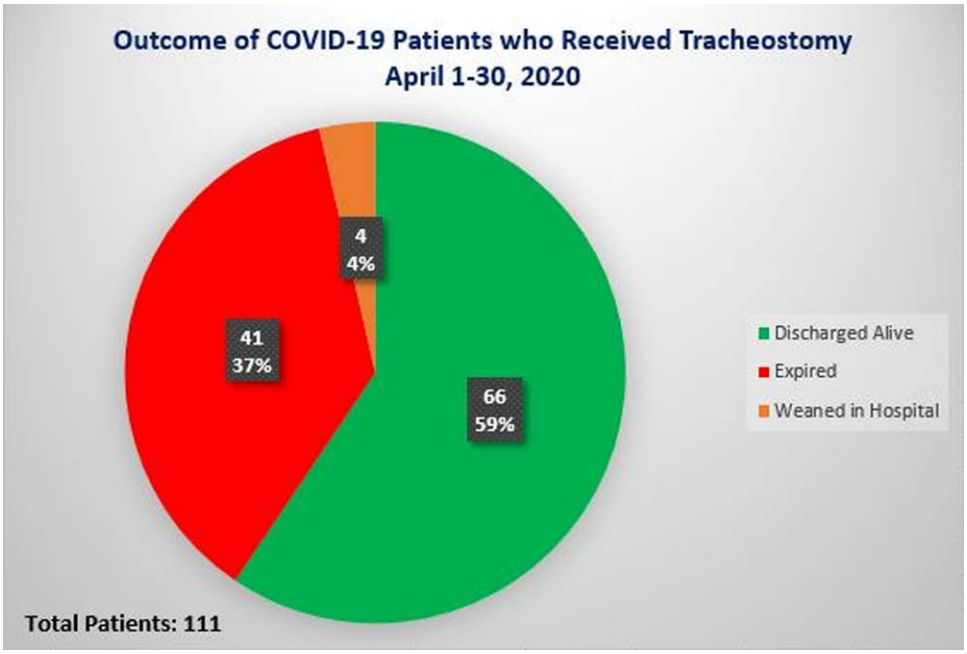

Figure 1. Sixty days outcome of 111 coronavirus disease 2019 (COVID-19) patients who received tracheostomy in April 2020. Demonstration of number and percentages of patients discharged alive (66, 59%), expired (41, 37%), and remained hospitalized (4, 4%). All four remaining hospitalized patients were weaned from mechanical ventilation.

A clear solution in our organization was utilization of the already established Institute for Critical Care Medicine Tracheostomy Team (ICCM-TT), with its multidisciplinary members from departments including Surgery, Critical Care, Cardiac Surgery, Thoracic Surgery, and Otolaryngology. In the nine ICUs dedicated to the management of COVID-19 critical care patients in April 2020, the ICCM-TT performed 111 tracheostomy procedures. Case selection for all procedures involves multidisciplinary team evaluation and factors patient medical stability, with patient's wishes after discussing goals of care. Median time from translaryngeal intubation to tracheostomy was 11 days. All cases were performed at bedside, using percutaneous dilatational technique (PDT) with bronchoscopic guidance using a single-use bronchoscopes. Prior to COVID, PDT was the standard for the majority of tracheostomies performed for intubated ICU patients at Mount Sinai Hospital. PDT has long been accepted as the standard of care (8), together with the familiarity of the team with PDT technique, and the utilization of real-time ultrasound guidance in cases identified to have difficult anatomical landmarks made the decision to perform PDT a clear choice. Additional advantage in COVID-19 patients, there is less exposure to open respiratory epithelium in PDT compared to open technique. A modification from the standard PDT technique was to minimize interruption of the ventilator circuit and holding ventilation anytime the circuit needed to be disrupted, similar to other reports (7).

Results of this approach have yielded the following patient outcomes to date: 66 patients (59%) were discharged alive, 41 patients (37%) expired, and the remaining four patients (4%) were weaned from mechanical ventilation (no ventilatory support, downsized tracheostomy tube, or decannulated) but still hospitalized on non-ICU floors (**Fig. 1**). All of the 111 procedures were performed within 1 day of the tracheostomy requests unless medical instability mandated postponing of the procedure or revisiting goals of care.

Regarding staff outcomes, none of the ICCM-TT members acquired COVID-19 infections, no one has shown symptoms of COVID-19, and additionally, all have tested negative for antibodies. The concern of increased risk of transmission of infection to providers from PDT with potentially active infection can be minimized using proper personal protective equipment (PPE) and training without delaying the needed procedure. Of note, powered air purifying respirator (PAPR) devices were dedicated to the ICCM-TT to be used during the PDT. The safe performance of the PDT was likely due to the thorough pre-procedural planning, adherence to ICCM-TT protocols, and vigilance in maintaining infection control guidelines. It is not clear if the use of PAPR added another layer of safety, but it required additional training on donning and doffing as well as proper disinfection between procedures, these were strictly followed.

The recommendation to delay tracheostomy to a new category, the very late tracheotomy after 21 days is asking for a significant change in the standard of care with no data to support such recommendations. As medical specialties respond to the immediate COVID-19 surge and thereby gain experience in its management, analysis of outcomes will shape our future protocols. Based on standard guidelines that describe the benefits of tracheostomy to overall care and our own experiences during COVID-19, we advocate that tracheostomy placement should not be delayed. The availability of the experienced dedicated team (ICCM-TT), strictly following strategies and protocols and the proper PPE use, modification of the technique, allowed performing the procedure when needed instead of delaying it to mitigate the risk of viral transmission.

The authors have disclosed that they do not have any potential conflicts of interest.

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REFERENCES

1. Dochi H, Nojima M, Matsumura M, et al: Effect of early tracheostomy in mechanically ventilated patients. *Laryngoscope Investig Otolaryngol* 2019; 4:292–299

2. Tai HP, Lee DL, Chen CF, et al: The effect of tracheostomy delay time on outcome of patients with prolonged mechanical ventilation: A STROBE-compliant retrospective cohort study. *Medicine (Baltimore)* 2019; 98:e16939
3. Hosokawa K, Nishimura M, Egi M, et al: Timing of tracheotomy in ICU patients: A systematic review of randomized controlled trials. *Crit Care* 2015; 19:424
4. Andriolo BN, Andriolo RB, Saconato H, et al: Early versus late tracheostomy for critically ill patients. *Cochrane Database Syst Rev* 2015; 1:CD007271
5. Michetti CP, Burlew CC, Bulger EM, et al; Critical Care and Acute Care Surgery Committees of the American Association for the Surgery of Trauma: Performing tracheostomy during the Covid-19 pandemic: Guidance and recommendations from the Critical Care and Acute Care Surgery Committees of the American Association for the Surgery of Trauma. *Trauma Surg Acute Care Open* 2020; 5:e000482
6. Parker NP, Schiff BA, Fritz MA, et al: Tracheotomy Recommendations During the COVID-19 Pandemic. Alexandria, VA, Airway and Swallowing Committee of the American Academy of Otolaryngology-Head and Neck Surgery, 2020. Available at: https://www.entnet.org/content/tracheotomy-recommendations-during-covid-19-pandemic. Accessed August 11, 2020
7. Chao TN, Braslow BM, Martin ND, et al; Guidelines from the COVID-19 Tracheotomy Task Force, a Working Group of the Airway Safety Committee of the University of Pennsylvania Health System: Tracheotomy in ventilated patients with COVID-19. *Ann Surg* 2020; 272:e30–e32
8. Kornblith LZ, Burlew CC, Moore EE, et al: One thousand bedside percutaneous tracheostomies in the surgical intensive care unit: Time to change the gold standard. *J Am Coll Surg* 2011; 212:163–170

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