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Journal of Clinical Otorhinolaryngology
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Research Article

# Tracheostomy for COVID Patients is Safe for Surgeons and Staff; Practical Experience

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**Received date: May 19, 2022: Accepted date: August 29, 2022: Published date: September 08, 2022**

**Citation:** Aurora G. Vincent, Weitao Wang, Tom Shokri, Abdul Rahman Alenezi, Arya4Namin, Yadranko Ducic. (2022) Tracheostomy for COVID Patients is Safe for Surgeons and Staff; Practical Experience. *Journal of Clinical Otorhinolaryngology* 4(5); DOI: 10.31579/2692-9562/058



## Abstract

**Background:** Patients who are severely affected by COVID-19 often experience respiratory distress necessitating intubation and subsequent tracheostomy. In the face of unknown transmissibility and staff risks, policy changes have been enacted across the nation's hospitals and care centers to mitigate the risk of provider exposure. There are many published recommendations and "guidelines" about tracheostomy in COVID-19 patients, but all seem based on expert opinion rather than objective patient experience.4-6 Herein, we present the first case series in the United States of America of tracheostomy in known COVID-19-positive patients.

**Method:** We reviewed our experience with tracheostomy in known COVID-19-positive patients from March to June 2020. The senior author (YD) performed bedside procedures, and the surgeon and all staff present in the room underwent weekly antibody testing for COVID-19.

**Results:** Five patients underwent bedside tracheostomy. All patients were subsequently successfully weaned from ECMO; three tolerated room air oxygenation within two weeks of surgery, while two weaned to continuous positive airway pressure (CPAP). Neither the surgeon nor any staff present in the room at the time of surgery developed COVID-19 symptoms or a positive antigen test within one month after the procedure.

**Conclusion:** Herein, we present an objective evaluation of COVID-19 patient and provider outcomes after tracheostomy. Contrary to current recommendations and expert reports, our case series demonstrates that bedside tracheostomy with standard PPE including an N95 mask can safely be performed without increased risk to patients, surgeons, or staff.

**Keywords:** COVID; novel corona virus; tracheostomy; safety

## Introduction

As the novel coronavirus 19 (COVID-19) pandemic has spread across the United States and world, there have been numerous concerns raised about how to balance patient treatment with provider safety in the face of shortages of personal protective equipment (PPE) as well as unknowns about the true disease transmissibility, morbidity, and mortality. The virus is known to primarily affect the airway, and higher viral loads have been demonstrated to be carried in the upper aerodigestive tract than the distal bronchi and lungs [1]. Often, patients who are severely affected by COVID-19 experience respiratory distress necessitating intubation [2].

A common indication for tracheostomy is respiratory failure with a prolonged course of intubation, to improve patient comfort, decrease the requirement for sedating medications, and mitigate the risk of tracheal stenosis.

Relatively early in the pandemic's course in the United States, however, reports began circulating about a severe risk to surgeons and staff members exposed to the upper airway tissues of patients with COVID-19. One such report noted that an otolaryngologist in Wuhan, China performed a trans-nasal endoscopic pituitary excision on a COVID-19-positive patient, and that, subsequently, all fourteen members of the

operating room staff who were in the room at the time contracted the disease, some of them perishing [3].

Similar reports have been circulated, coming from different regions of the world. As a result, countless policy changes have been enacted across the nation's hospitals and care centers to mitigate the risk of provider exposure. In some cases, these policies have led to significantly increased consumption of an already-burdened supply of PPE, and in others to sub-optimal patient care. To date, however, the authors have been unable to verify these claims or to find any factual support in the literature. There are many published recommendations and "guidelines" about tracheostomy in COVID-19 patients, but all seem based on expert opinion rather than actual patient experience [4-6]. Herein, we present the first case series in the United States of America of tracheostomy in known COVID-19-positive patients.

## Method

We reviewed our experience with tracheostomy in known COVID-19-positive patients from March to June 2020. The senior author (YD) performed bedside procedures given institutional concerns regarding COVID-19 patients in the operating room. In each case, the surgeon wore an N95 mask, disposable gown, disposable eye protection, and sterile gloves. In each case there were five people in the room, gathered immediately around the patient's bed; the surgeon, surgical technician, nurse, nurse anesthetist, and respiratory therapist. The procedure was completed with a transverse cervical incision and dissection using a #15 blade and electrocautery. Ventilation was paused just before entering the airway and held until the trach tube was secured in position and connected to the circuit. Following, the mask, gown, and gloves were discarded, and the surgeon and all staff present in the room underwent weekly antibody testing for COVID-19.

## Results

Five patients underwent bedside tracheostomy, as described above, during the study period. Each procedure was completed within seven minutes. All five were on extracorporeal membrane oxygenation (ECMO) at the time of surgery. In these cases, anticoagulant medications were continued, and the tracheostomal tract was packed with surgical for hemostasis. Following tracheostomy, all patients who had required ECMO were successfully weaned from all mechanical support; three tolerated room air oxygenation within two weeks of surgery, while two weaned to continuous positive airway pressure (CPAP) one week after surgery. Neither the surgeon nor any staff present in the room at the time of surgery developed COVID-19 symptoms or a positive antigen test within one month after the procedure.

## Discussion

Herein, we present the first case series of COVID-19 patient and provider outcomes for bedside tracheostomy in the United States. Our results suggest that the procedure is safe for both patients and providers, contrary to numerous reports and recommendations that have circulated over the past three months based on level 5 evidence. Our results also suggest the procedure can be safely accomplished at bedside by an experienced surgeon with standard PPE and no special equipment. The paucity of factual evidence upon which to base guidelines has perhaps created unnecessarily conservative or fear-driven policies across the nation resulting in excessive use of PPE or sub-optimal patient care due to concerns of provider safety. Our experience represents a small case series and should be followed with larger investigations to illuminate the true risk of COVID-19 transmissibility and morbidity in the setting of tracheostomy.

There are many published guidelines based on expert opinion regarding tracheostomy for known COVID-19 positive patients [6-9]. These recommendations have highlighted the hospital system's benefit of performing the tracheostomy procedure bedside in the intensive care unit, while also acknowledging that the optimal location for a tracheostomy will likely differ between facilities [6,8,9]. There is little data to support the degree of personal protective equipment, however, powered air-purifying respirators (PAPRs) versus N95 masks and eye protection have been advocated for [6,9]. In this study we found that N95 masks and standard surgical PPE prevented transmission to the surgical team. Minimizing the use of electrocautery has been advocated for both during the current COVID-19 pandemic and the SARS outbreak in 2003 [6,10]. There is no data to support that avoidance of electrocautery would decrease the risk of transmission to the surgical team. The viral load within the soft tissues of the neck is not expected to be high. Therefore, as long as electrocautery is only utilized outside of the trachea it would not appear to increase aerosolization of the viral particles. Additional recommendations include the use of muscle relaxants in order to minimize coughing during insertion of the tracheostomy tube into the trachea, and pausing ventilation during insertion of the tracheostomy tube in order to minimize the amount of aerosolized particles leaving the patient [6,7,9].

Two retrospective case series from China and Italy have been published demonstrating no cases of transmission to the surgical team during tracheostomies in known COVID-19 positive patients [11,12]. In a study from Italy examining 28 patients who underwent tracheostomy, no cases of transmission to the surgical team were identified, although the type of PPE utilized and monitoring protocol amongst the surgical team was not clarified [11]. In a retrospective case series of 11 patients from China, they demonstrated that tracheostomy can be performed safely for both the patient and providers [12].

## Conclusion

Herein, we present an objective evaluation of COVID-19 patient and provider outcomes after tracheostomy. Contrary to current recommendations and expert reports, our case series demonstrates that bedside tracheostomy with standard PPE including an N95 mask can safely be performed without increased risk to patients, surgeons, or staff.

## Disclosures

The authors have no financial or other conflicts of interest to disclose. The work herein does not necessarily represent the views of the United States Army or Department of Defense.

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**DOI: 10.31579/2692-9562/058**