

Safe Extubation of Patients with COVID-19 for Minimizing Aerosolized Droplets

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Abstract

Background: Healthcare workers must be protected during extubation of patients with coronavirus disease 2019 (COVID-19) owing to the presence of aerosolized droplets. Herein, we report a technique for extubating a patient with COVID-19 while minimizing aerosol dispersion.

Case Report: We retrospectively identified a total of 79 patients admitted to our hospital from February 2020 to January 2021. Six of these patients were intubated for mechanical ventilation, 2 of whom had to be extubated. We prepared a clear vinyl sheet in the shape of a tent to place over the patient, and 2 staff members, both well experienced in airway management, stood outside the tent on either side of the patient. Before extubation, we confirmed that the patient's consciousness level was good and the patient had no distress by adjusting the dose of sedative drugs. After extubation, a surgical mask was placed on the patient's face.

Conclusion: Our experience indicates that this method of extubation in a patient with COVID-19 could be safely implemented to protect healthcare workers.

Keywords

COVID-19, PPE, safety, tracheal extubation, access to care

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Introduction

The ongoing coronavirus disease 2019 (COVID-19) pandemic has gripped the world and seems like a never-ending ordeal. The disease is caused by the severe acute respiratory syndrome coronavirus 2, which is transmitted via aerosolized droplets.¹ Patients with COVID-19 experience respiratory failure and often require mechanical ventilation. Therefore, healthcare workers must be careful to avoid spreading the droplets, especially while performing airway manipulation during tracheal extubation. Therefore, we have to develop a strategy to not only provide optimal patient care but also protect the hospital staff.² One study reported on the use of a portable aerosol hood during extubation.³ However, in this box-type device, the position of the hole is fixed, making it difficult to maneuver in a narrow space during airway management. Another method includes the use of a barrier drape over the patient's face, with the tracheal tube emerging through a slit in the drape.⁴ However, the ventilator

disconnects from the tracheal tube when the tube is passed through the slit in the drape. This could result in the spreading of droplets and viruses. In addition, the barrier drapes could be uncomfortable for patients who regain consciousness just before extubation.

Case Report

We retrospectively identified the patients with COVID-19 who were admitted to our hospital between February 2020 and January 2021. A total of 79 patients were admitted to our hospital during this period. Six of these patients were intubated for mechanical ventilation, 4 of which underwent

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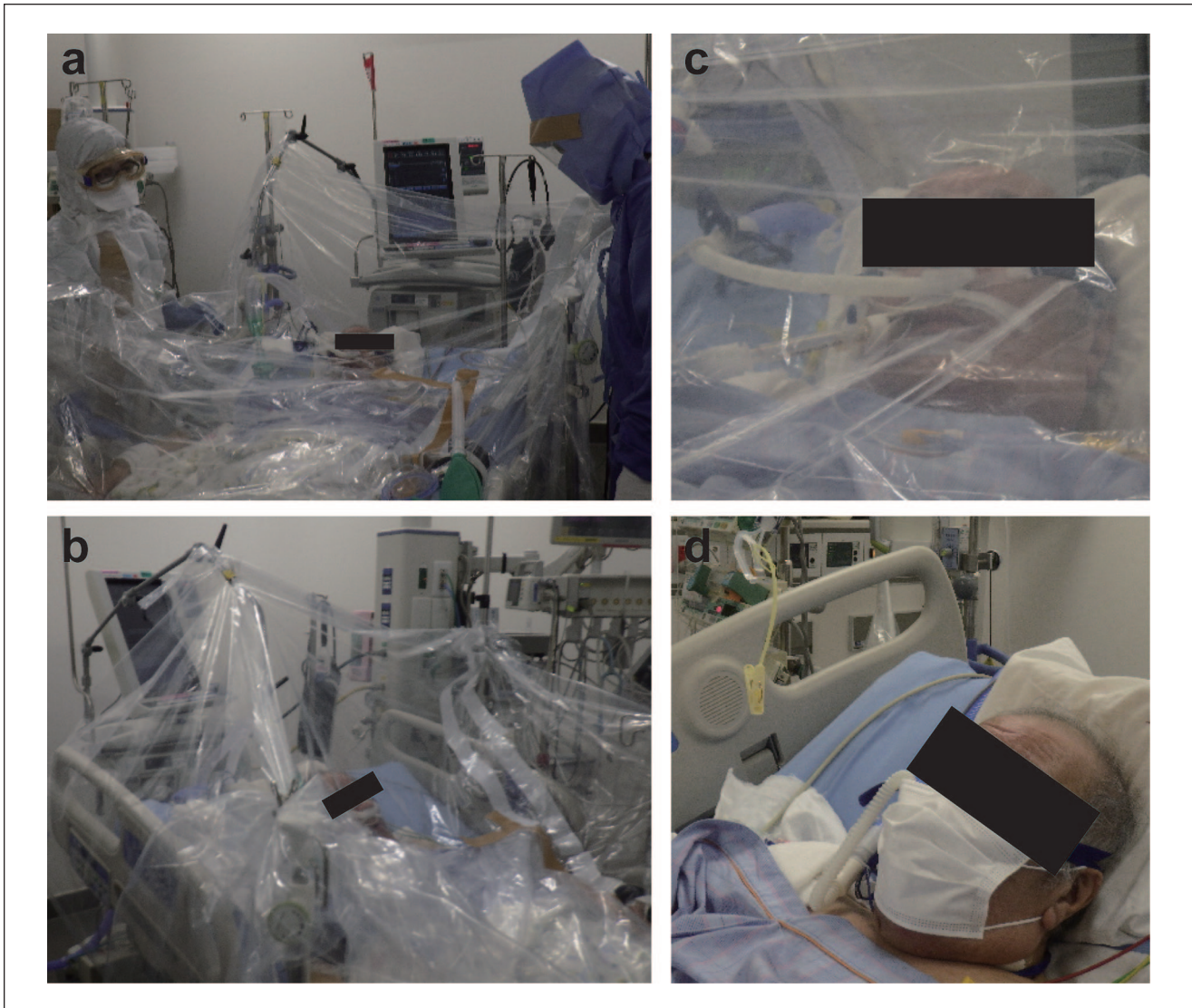


Figure 1. Extubation of COVID-19 patients: (a) a staff member stands on either side of the patient before extubation. The member on the right side extubates the patient, and the member on the left side assists the extubating staff member, (b) barrier vinyl sheet in the shape of a tent, (c) before extubation: the patient is connected to a high-flow nasal cannula (HFNC), and (d) after extubation: a surgical mask is placed on the patient's face with the HFNC.

tracheostomy. Therefore, the remaining 2 patients had to be extubated.

Herein, we present a method to protect healthcare workers from exposure to aerosolized droplets during extubation (Figure 1). We constructed a tent-shaped barrier around the patient's head using clear vinyl. To minimize the number of staff members present during the procedure, we selected only 2 staff members with sufficient experience in airway management. The extubating physician stood on the right side of the patient, and the assisting nurse stood on the left side. They inserted their hands into the transparent tent and performed the extubation procedure. Before extubation, the

patient's consciousness level was confirmed to be 11 using the Glasgow Coma Scale (E4VTM6), and the patient was confirmed to be under no distress by adjusting the dose of fentanyl and dexmedetomidine. Although the patient coughed immediately after extubation, the tent prevented the spread of the aerosolized droplets. The staff also attempted to prevent spread of the aerosolized droplets after extubation. The patient was connected to a high-flow nasal cannula (HFNC) before extubation, and a surgical mask was placed on his face immediately after extubation. The staff minimized contact with the patient immediately after extubation, thereby protecting themselves from aerosolized droplets.

Discussion

The advantage of this method is that the tent-shaped, clear vinyl barrier is easy to prepare, inexpensive, and easy to manipulate during extubation. Another method uses a shower-cap style clear plastic bag that is rimmed by an elastic band⁵; however, this approach offers a narrower space, and maneuvering during extubation would be difficult. When the surgical mask is placed on the patient's face after extubation, the secretions in the oral cavity can be easily suctioned. A previous report⁶ details the placement of the surgical mask on the patient's face before extubation; however, this approach may cause airway obstruction owing to the secretions in the oral cavity. One study showed that placing a surgical mask over high flow nasal oxygen devices reduces aerosol dispersion.⁷

There are some limitations to our method. First, we did not quantify the effect of this protection during the COVID-19 pandemic. Further studies are needed to quantify the aerosolized droplets. Second, the number of patients who could be extubated was small. Therefore, we were not able to evaluate the risk of infection to the staff after the extubation procedure. Third, clear vinyl tears easily; there is a potential risk of holes developing in the clear vinyl, which could allow the spread of aerosolized droplets.

Conclusions

Finally, we have reviewed the previous literature and recommend the following measures to be undertaken during extubation of patients with COVID-19:

- Use of a negative pressure room.
- Employing minimum staff with mandatory N95 respirator and personal protective equipment; 2 staff members are recommended.
- Constructing a barrier using vinyl sheet in the shape of a tent.
- Positioning the staff, that is, the extubating and assisting staff member, on either side of the patient.
- Connecting the patient to an HFNC before extubation, if necessary.
- Placing a surgical mask on the patient's face immediately after extubation.

This technique could be useful for safe extubation and minimization of the spread of the droplets and the virus.

Declaration of Conflicting Interests

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Consent Publication

Written informed consent for patient information and images to be published was provided by the patient.

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