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Videolaryngoscopy Intubation in Patients with COVID-19

How to Minimize Risk of Aerosolization?

To the Editor:

The highest viral load of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is found in the sputum and upper airway secretions.[1] Therefore, endotracheal intubation, extubation, connection, and disconnection of the ventilatory circuit in patients infected with coronavirus disease 2019 (COVID-19) may cause aerosolization that may contaminate the personal protective equipment, exposed body parts, or even the airway of the person handling the airway.[2,3] Direct contact and droplet spread of respiratory secretions remain the predominant mode of spread, yet airborne transmission may occur, and taking precautions in aerosol-generating procedures should be done.[3]

Videolaryngoscopy is ideally recommended in patients infected with COVID-19 to increase the distance between the operator's face and the patient's face to minimize the risk of contamination.[3] In addition, videolaryngoscopy offers a better view of the glottic entrance and can facilitate a quick-pass first-attempt tracheal instrumentation.[4] However, the performance of different videolaryngoscope models in patients infected with COVID-19 remains unknown because no comparative data have been validated. It is well known that some manufacturers of videolaryngoscopy equipment advocate the use of stylets in the endotracheal tube (ETT) to facilitate easy insertion into the trachea, especially in suspected difficult airway.[4] However, two concerns exist during videolaryngoscopy intubation with a preloaded tube on an introducer[5,6]: (1) A patient may cough during tracheal instrumentation and expel a virus-containing cloud of particles *via* reverse outflow across an unsealed endotracheal tube facing the operators; (2) Stylet removal after endotracheal intubation may increase the risk of contamination.

We describe using a channeled videolaryngoscope to manage a difficult airway in a 31-yr-old female suspected to be infected with COVID-19 undergoing emergency laparotomy with unstable vital signs. All involved staff wore appropriate personal protective equipment.[2]

With full monitoring in place and after 5-min preoxygenation with low-flow oxygen at 3 l/min using nasal cannula with surgical mask *in situ* covering the patient's mouth and nose, rapid sequence induction was started using intravenous xylocaine 1 mg/kg, fentanyl 1.5 mcg/kg, propofol 2mg/kg, and rocuronuim 1 mg/kg subsequently. The ETT was lubricated and loaded inside the channel of the Airtraq and directly connected to the circuit before induction (fig. 1A). A minute later, with the patient head shielded away from the anesthesiologist by a closed plastic box (fig. 1B), the surgical mask was removed and the channeled-type Airtraq videolaryngoscope with camera-connected C-MAC videolaryngoscopy screen was introduced into the mouth. The glottic opening was visualized and the trachea was successfully intubated from the first attempt with a closed circuit without the need for a stylet, or any maneuver. While removing the videolaryngoscope the ETT cuff was inflated immediately and the second pair of gloves of the operator was used to seal the used Airtraq, which was disposed of into the plastic bag, then volume ventilation mode was initiated (Supplemental Digital Content video, http://links.lww.com/ALN/C398). However, dislodging the ETT from the side channel of the

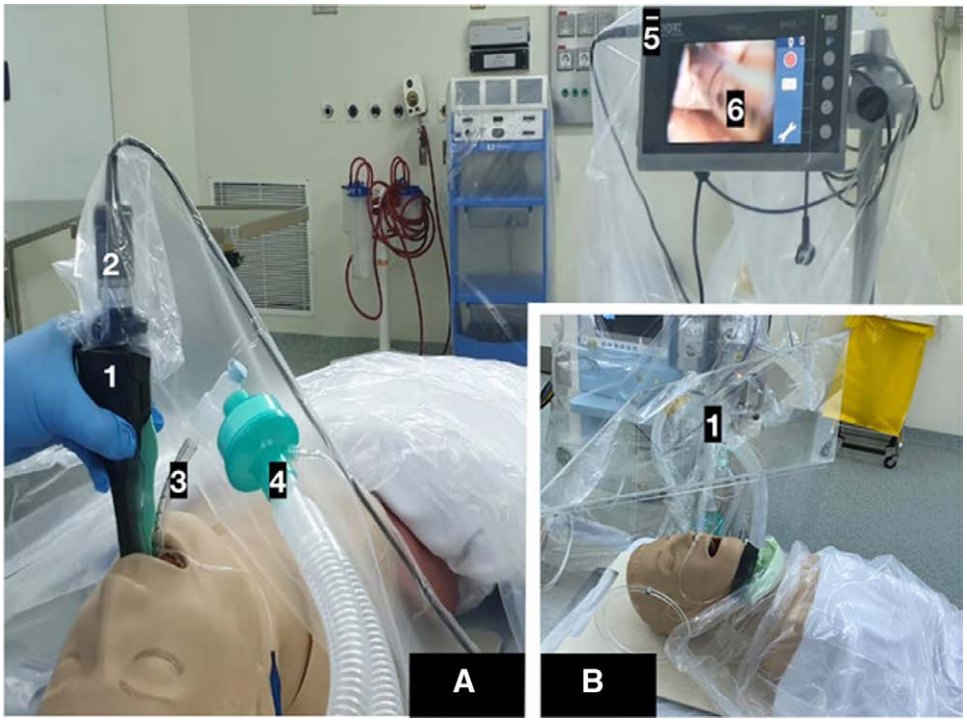

Fig. 1. Simulated case. (*A*) The plastic box was removed to enable a better view of the airway. 1: Airtraq; 2: connected camera; 3: endotracheal tube (ETT) loaded into Airtraq channel; 4: closed connection of ETT–ventilatory circuit; 5: C-MAC display; 6: ETT inside the trachea. (*B*) 1: The transparent plastic box, with holes, used in our described case.

videolaryngoscope can sometimes be challenging, especially inside the box, and careful manipulation is needed to minimize contact with the mouth and potential viral transmission. This approach of airway management is used in our anesthesia department for all indicated cases and variations in the sequence could be made based on local preferences. In conclusion, we believe that endotracheal intubation techniques must protect healthcare workers and reduce the risk of viral transmission *via* an unsealed airway. The use of stylet-free channeled videolaryngoscope with closed circuit ventilation would be recommended to minimize risk of aerosolization in suspected or confirmed COVID-19 cases.

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Competing Interests

The authors declare no competing interests.

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Considerations for Assessing Risk of Provider Exposure to SARS-CoV-2 after a Negative Test

To the Editor:

Coronavirus disease 2019 (COVID-19) is caused by infection with the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). The transmission of coronaviruses occurs *via* direct contact, droplets, and aerosols. Healthcare professionals involved in airway management of patients infected with SARS-CoV-2 are at high risk of exposure and subsequent infection, as has been observed in previous coronavirus epidemics.[1] This risk is most pronounced in aerosol-generating procedures such as intubation. On March 22, 2020, the American Society of Anesthesiologists (Schaumburg, Illinois), in partnership with other professional organizations, offered guidance for the use of personal protective equipment that have been interpreted by some providers as recommending the use of airborne precautions for all aerosol-generating procedures during the pandemic.[2]

Healthcare systems operating under pandemic conditions may need to balance the protection of staff with the allocation of scarce resources, including personal protective equipment. One strategy to address this problem relies on preprocedural testing of asymptomatic individuals. Recent publication of data suggesting imperfect clinical sensitivity of reverse transcription polymerase chain reaction assays for SARS-CoV-2[3] could lead healthcare providers to intuitively question the wisdom of a strategy that relies on a negative SARS-CoV-2 test, particularly when planning high-risk procedures such as endotracheal intubation. Knowledge of test characteristics, however, is insufficient to guide decision making: the prevalence of the disease in the population for which the test is performed has a critical bearing on the information provided by the test. Prevalence estimates are complicated by the fact that they will differ (sometimes substantially) between different locations, may be unavailable or poorly measured, and will be inherently dynamic during a pandemic. These uncertainties may substantially affect the safety of both patients and providers and may impact the utilization of scarce resources such as personal protective equipment.

To help providers and clinical leaders grapple with this dynamic uncertainty, we have developed an online tool (https://covid-airway-npv.info) that enables the user to examine the impact of different assumptions regarding SARS-CoV-2 reverse transcription polymerase chain reaction test characteristics and disease prevalence on the potential risk of provider exposure during airway management. Uncertainty is modeled by asking the user to provide the most likely, minimum, and maximum value of the parameter (here, SARS-CoV-2 testing characteristics and COVID-19 community prevalence), using a Project Evaluation and Review Techniques distribution.[4] The Project Evaluation and Review Techniques distribution was initially developed by the U.S. Navy in an effort to add mathematical rigor to the process of complex project planning, and requires users to provide input uncertainty to enable modeling of output uncertainty.[5]

To inform an example calculation, we use publicly published data for analytic specificity of the Quest Diagnostics reverse transcription polymerase chain reaction assay (likely 100%, minimum 95%, maximum 100%) and an informed but pessimistic assumption regarding the clinical sensitivity of the reverse transcription polymerase chain reaction assay (likely 90%, minimum 65%, maximum 99%). Estimation of population prevalence is challenging: the minimum in this scenario is based on a recent measurement of the prevalence of reverse transcription polymerase chain reaction positivity among asymptomatic individuals in Iceland (0.6%), while our maximum is based on a recently published estimate among asymptomatic parturients at a major academic center (13.8%).[6,7] As is the case with nearly all measurements of disease prevalence, both of these estimates were measured in unique populations at specific points in time. We chose a "most likely" prevalence estimate of 1.0% based on preliminary, unpublished data emerging from various screening programs within our own health system. A screenshot from the calculator's analysis under these assumptions is depicted in figure 1. A 90% credible interval for negative predictive value is bounded by 0.06% and 1.12%, giving posttest probabilities of disease ranging from 1 in 89 to 1 in 1,636, and centered at 1 in 338. It is worth noting that a provider in Iceland and another in New York City might have very