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Walking the line between benefit and harm from tracheostomy in COVID-19

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Coronavirus disease 2019 (COVID-19) has caused tens of thousands of intensive care unit (ICU) admissions worldwide, and this number is still increasing at a rapid speed in many countries as of early May, 2020. The main reason for ICU admission of patients with COVID-19 is the need for respiratory support, usually implying invasive mechanical ventilation. Most of these patients will depend on invasive ventilation for a considerable period of time, which can easily overwhelm ICU capacity in regions where the pandemic hits.[1] In ventilated patients, the main indication for tracheostomy is facilitating a long period of ventilation and weaning from ventilation, which applies to approximately 10% of ventilated patients who are given this procedure in usual ICU practice. Patients with COVID-19 can have extensive pulmonary injury that requires lengthy ventilation, and they might develop muscle weakness during the course of their ICU stay. In our experience, patients with COVID-19 can also produce thick airway secretions that are difficult to evacuate, which can be a cause of re-intubation. These disease characteristics indicate that a substantial proportion of patients with COVID-19 might benefit from tracheostomy.

Some of the challenges associated with tracheostomy are specific to the current pandemic context, including the infection risks of aerosol-generating procedures and overstretched ICU capacity. Important issues are the selection of patients with COVID-19 who might benefit from a tracheostomy and the optimal timing of the procedure in these patients. Safety of tracheostomy for both patients and health-care workers is another important issue, and ensuring a safe environment and proper care for patients discharged from the ICU with an endotracheal cannula. In *The Lancet Respiratory Medicine*, Brendan McGrath and colleagues[2] report results from an international tracheostomy consensus working group, which was convened to addresses these issues. The working group provides authoritative guidance on case selection, timing and performance of tracheostomy, and management after tracheostomy in the context of the COVID-19 pandemic. The recommendations and suggestions are pragmatic and build on evidence from previous epidemics, supplemented by current international and multidisciplinary expert opinion.

The consensus working group suggests that tracheostomy be delayed until at least day 10 of invasive ventilation and considered only when patients are showing signs of clinical improvement. This timeframe coincides with the expected decrease in infectivity of the virus after 10 days of illness and fits with the timeline of other aspects of the disease course. First, patients with COVID-19 in need of invasive ventilation benefit from prone positioning in the first days and weeks after symptom onset, and facing downwards and turning procedures are established contraindications for tracheostomy. Second, placing the cannula can be unsafe in those with severely compromised gas exchange, which is often the situation for patients with severe COVID-19 in the first days of invasive ventilation. These patients usually do not tolerate a loss of positive airway pressure, which is unavoidable during the tracheostomy procedure, whatever technique is used.

In many health-care centres, the indication for tracheostomy in patients without COVID-19 is an expected duration of ventilation of more than 10 days,

which in practice might translate to placing the cannula well before day 10 if this can be done safely. If we follow the working group's suggestion to delay the procedure until after day 10, tracheostomies will probably only free up ICU capacity by reducing ventilator use in patients with an extended weaning trajectory. No clear evidence exists on how to identify this subgroup of patients with COVID-19, but cases could include those with pre-existing frailty, those who have or who develop muscle weakness, and those who have difficulty evacuating airway secretions. Whether ventilation characteristics can be used to triage patients for tracheostomy is as yet unknown.

Another important concern is the safety of personnel, since tracheostomy is an aerosol-generating procedure with a considerable infection risk for health-care workers. Thus, McGrath and colleagues suggest the use of enhanced personal protective equipment, including face shields, FFP3 or N95 masks, or even powered air-purifying respirators (PAPRs),[3] in addition to fluid-repellent disposable surgical gowns and gloves. The authors note that during the 2003 severe acute respiratory syndrome (SARS) outbreak, surgical tracheostomies were favoured over percutaneous tracheostomies.[4,5] The surgical approach allows the inflated cuff of the endotracheal tube to be placed below the tracheostomy site, which not only minimises the duration of apnoea, but also the duration of dispersion of aerosols from an exposed open airway.

Concerns about the safety of patients and health-care workers continue after the tracheostomy procedure, including those pertaining to the transfer of patients who have had a tracheostomy to a normal hospital ward after ICU discharge (eg, questions about the timing and destination of transfer, and the safety of transfer with a trachea cannula). Health-care workers remain at risk of infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) when taking care of patients with COVID-19 who have had a tracheostomy, because shedding of the virus can persist for several weeks,[6] which is of particular concern because not all health-care workers will know how to handle the tracheostomy cannula in a safe way. In our institution in Amsterdam, patients with a tracheostomy are not allowed to be discharged to a normal facility (Schultz MJ, unpublished).

Finally, how the recommendations and suggestions translate to the care of patients with COVID-19 in resource-limited settings is an important consideration. Low-income and middle-income countries will carry a substantial part of the pandemic disease burden. Due to the high costs of transcutaneous tracheostomy techniques, most hospitals in these settings will rely on a surgical procedure. Protection of health-care staff is a serious concern, because personal protective equipment is often in short supply. Many hospitals will rely on locally produced plastic gowns and plastic face guards (Pattnaik R, unpublished). Advanced methods, such as the use of PAPRs, will generally not be available. In these settings, few health-care workers are likely to be experienced in the care of patients with a tracheostomy and availability of infrastructural and organisational safety prerequisites can be suboptimal. Local adaptation of the working group's guidance in resource-limited settings might be needed.[7]

We commend McGrath and colleagues for the rapid and timely provision of this important and comprehensive guidance on tracheostomy in the context of the current COVID-19 pandemic. As the authors indicate, suggestions from the guidelines can be refined as more evidence becomes available. The adaptation of these and other COVID-19-related guidelines for clinical practice in resource-limited settings deserves our attention.

We declare no competing interests.

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