

LETTER

A framework for open tracheostomy in COVID-19 patients

Sir

The COVID-19 pandemic is causing untold disruption across the globe, and all countries irrespective of the strength and resilience of their health systems are feeling the burden. Intensive care units are facing a surge of patients requiring invasive ventilation.

It is likely that requests for a tracheostomy in COVID-19 ventilated patients will soon come our way. It is difficult to predict the burden, but it would be remiss not to be prepared. Tracheostomy is almost certainly an aerosol generating procedure and represents a risk to surgeons and others in the operating room. In the SARS epidemic, a survey suggested that healthcare workers who performed tracheostomy had a fourfold increased risk of developing disease.¹ Full personal protective equipment must be used, as failure to comply is a risk factor for infection in healthcare workers.^{2,3}

We have developed guidance and cognitive aids to help departments prepare for tracheostomies in COVID-19 patients (Figure 1A-D), based upon processes that we believe minimise risk of aerosol generation. This builds on earlier opinion⁴ and incorporates our experience from simulation with a multidisciplinary team. We also consulted with a number of stakeholders, the Head & Neck Society of ENT UK, British Head & Neck Oncologists (BAHNO), British Laryngological Association, National Tracheostomy Safety Project,

Difficult Airway Society (DAS) and the executive of ENT UK, who endorse the guidance.

Although general complications rates using a percutaneous technique are largely similar to open tracheostomies,⁵ the unanswered question here is which generates less aerosol exposure to the healthcare workers involved. Our own work with simulation would suggest that a controlled open technique as described here is potentially safer, but this is not yet validated in practice. This and other questions about when and where to perform these interventions will be influenced by local factors, competencies and experience.

Therefore, without being prescriptive, this guide is aimed at outlining the steps that can be taken by surgeons to best protect themselves and minimise aerosol generation when called on to perform open surgical tracheostomies on COVID-19 patients.

We suggest that departments identify a core "COVID-19 Airway team" who can rapidly adapt these guidelines to local factors and take a lead in training their colleagues. It is necessary and advisable to share the burden of these high risk and stressful events amongst all colleagues.

The key message is to prepare and stay safe.

CONFLICT OF INTEREST

None declared.

(A)

PLANNING (Days / weeks prior to procedure)**PPE**

Review ENT UK guidance on high-risk procedures
Surgeons and runners must wear full PPE
Consider additional protection for surgeons (eg. powered air purifying respirator)

Place

Ideally in a negative pressure theatre or isolation room
If not available consider a normal theatre with closed doors during the procedure
Consider turning off laminar flow (if present)
Antechamber or anaesthetic room (for donning/doffing and for clean runner)

Patient

Review indications for tracheostomy with ICU; specifically timing and prognosis.

Equipment

Pre-prepare tracheostomy sets in grab bags and store in a designated clean zone
Only use **cuffed, non-fenestrated** tracheostomy tubes
Ensure there is an adequate supply in various sizes
Establish a system to record what has been used and what needs restocking

COVID Airway Team

Designate staff to form a core COVID Airway Team to help facilitate efficiency during the crisis
Suggested team make up of ENT / Head & Neck consultant, registrar, ICU Consultant, Senior Theatre Nurse
Run simulation training with all key staff - on location

When

Semi – elective
Planned theatre slot with experienced anaesthetist and scrub team

(C)

PERFORMANCE (Once trachea is exposed)**Pause**

Inform anaesthetist of readiness to open trachea
Confirm paralysis
Pre-oxygenate with PEEP then stop ventilation and turn off flows
Allow time for passive expiration with open APL valve

Advance

Consider clamping ETT then deflate cuff and advance beyond proposed tracheal window
Hyperinflate cuff and re-establish oxygenation with PEEP
When adequately oxygenated, communicate clearly and cease ventilation prior to opening the trachea

Tracheal window

Create tracheal window taking care to avoid the ETT cuff
Turn off flows with open APL valve, allow passive expiration, consider clamping ETT
Deflate ETT cuff and draw back proximal to the tracheal window under direct vision
Ensure window is of sufficient size to allow easy insertion of tracheostomy tube without injury to cuff
Insert cuffed, non-fenestrated tracheal tube

Circuit connection

Immediately inflate tracheostomy tube cuff
Replace introducer with non fenestrated inner tube and HME
Prompt attachment of circuit
Resume ventilation

Confirmation

Confirm position of the tube in a 30 degree head up (ICU nursing) position
Confirm position with end-tidal CO₂ only (*avoid contamination of stethoscope by auscultation*)
Withdraw clamped ETT carefully

Secure

Secure tube with sutures and tracheostomy tapes
Use appropriate dressing
Doffing of PPE with "buddy check" in appropriate area with disposal of equipment as per local guidelines
Decontaminate theatre using local infection control guidance

(B)

PREPARATION (Day of Procedure)**Check**

Ensure PPE is available for all staff
Take tracheostomy grab bag and check contents – tracheostomy set, **cuffed non-fenestrated** tubes of appropriate sizes and HME with viral filter
Confirm designated staff are available and prepared (Anaesthetic, ENT, and scrub team)

Confirm

Indication and appropriateness of tracheostomy to be reconfirmed and documented

Briefing

To include but not limited to

Airway management steps generic to tracheostomy
Steps particular to COVID tracheostomy (see Figure 1C)
Request full paralysis throughout to reduce risk of cough

Equipment

Don PPE and perform "buddy check"
Lay out tracheostomy equipment including tube
Attach syringe to tracheostomy balloon ready for inflation
Consider preloading the HME onto the inner tube
Ensure only closed in-line suction is used for ETT and tracheostomy tube
Consider use of surgical ties rather than diathermy to prevent vapour plumes containing viral particles

Patient

Confirm readiness with surgeons, runner, nursing, anaesthetic team
Only now send for the patient

(D)

POST-PROCEDURE (ICU and beyond)**First week**

Exercise extreme care in transfer
One dedicated team member allocated to holding tracheostomy tube whenever being prone or turned
Humidified oxygen to be avoided if possible, HME only

Nursing care

Use only in line closed suction circuits at all times
Periodic check of cuff pressures
Cuff should not be deflated without considering risks to patient, staff and the environment.
Do not change dressings unless frank signs of infection

First tube change

Delay first tube change until at least 7-10 d
Full PPE
Perform same sequence of pause in ventilation with flows off before deflating cuff and inserting new tube with immediately re-inflation of cuff and reconnection of circuit

ICU stepdown

Ideally to a dedicated COVID tracheostomy ward with trained nursing staff
Cuffed non-fenestrated tube to be used until the patient is confirmed COVID negative
Subsequent planned tube changes at 30 d intervals

Decannulation

If patient is confirmed COVID negative and is to be moved to a COVID negative ward then consider trials of cuff deflation
Readiness for decannulation should be made with close liaison with SLT and physiotherapy

FIGURE 1 A, Planning steps recommended in the days and weeks prior to predicted tracheostomy. PPE = Personal Protective Equipment, COVID = novel Coronavirus-19 (nCov19), ICU: Intensive Care Unit, B, Proposed checklist for the day of tracheostomy. HME = Heat and Moisture Exchanger, ETT: Endotracheal tube. C, Performance of critical steps in open tracheostomy once the trachea is exposed. PEEP = Positive End-Expiratory Pressure, APL valve = Adjustable Pressure Limiting valve, CO₂ = carbon dioxide, D, Care for the tracheostomy patient after procedure in critical care and beyond. SLT = Speech and Language Therapist

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