

LETTER

Swivel-HEPA-ETT (SHE) bougie and HEPA-ETT (HE) methods for safe intubation while managing patients with COVID-19

Dear Editor,

At the end of December 2019, a novel strain of coronavirus, SARS-CoV-2, was discovered in Wuhan, China. This virus causes the Coronavirus disease COVID-19 that has spread to multiple countries across the world.^{1 2} The most severely ill patients have required intubation and ventilation, which will likely be performed by emergency physicians and anaesthesiologists. To reduce the risk of aerosol transmission during the intubation, usage of personal protective equipment (PPE, preferably PAPRs (Powered Air-Purifying Respirators)) and video laryngoscopy (VL) are recommended, along with sedation and paralysis of the patient.¹⁻³

Current intubation recommendations for patients with COVID-19 focus on high-efficiency particulate air (HEPA) filter usage connected between the bag valve and the patient mask during preoxygenation. After intubation, the HEPA filter is then disconnected from the bag valve mask and reconnected to the endotracheal



Figure 1 'HE' method: the white arrow indicates a HEPA filter, which stands for the 'H'. The ETT is loaded into the channel (white arrowheads) of an Ambu King vision video laryngoscope and stands for the 'E'. The ETT adapter is connected to the HEPA filter. ETT, endotracheal tube; HE, HEPA-ETT; HEPA, high-efficiency particulate air.

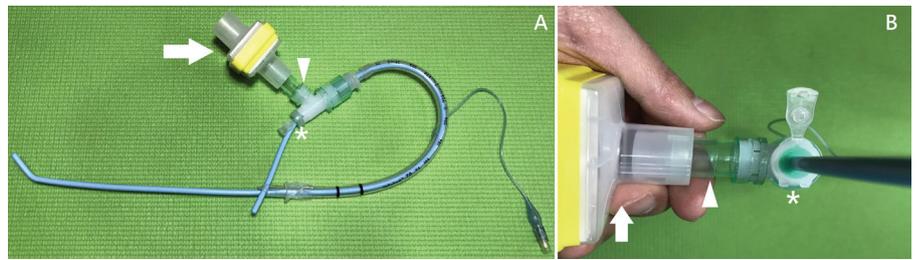


Figure 2 (A) The 'SHE' bougie method: the white arrowhead indicates a swivel-elbow and the white star indicates the seal port (Intersurgical, Berkshire, UK); they stand for the 'S'. The white arrow indicates a HEPA filter and stand for the 'H'. The ETT stands for the 'E'. The elastic bougie is preloaded into the ETT. (B) A close look of the combination of swivel-elbow (white arrowhead) and the seal port (white star), the HEPA filter (white arrow) and the bougie (Sumi ETT introducer with 5 mm diameter; Biotronic Instrument Enterprise, Poland) passes through the seal Port and preloaded in the ETT. ETT, endotracheal tube; HEPA, high-efficiency particulate air; SHE, Swivel-HEPA-ETT.

tube (ETT).^{4 5} However, we suggest using a closed system with the HEPA filter already attached to the ETT via either the HEPA-ETT ('HE') or 'Swivel-HEPA-ETT (SHE)-bougie' methods. The ETT combination with HEPA filter in advance can potentially reduce aerosolisation of the viral droplets from the larynx and trachea during intubation, and the ventilator can then be connected directly to the HEPA filter after intubation. These two methods can also allow for confirmation of ETT placement without auscultation, which may be difficult to perform while wearing PPE.

Caveat: The 'HE' and 'SHE' methods have not been rigorously tested; they are suggestions for potentially safer intubation. Use of these methods does not mean the healthcare team can become complacent about PPE. These methods must be practised in simulation prior to their use in real patients; if not practiced previously, it can lead to increased stress and potential for higher incidence of aerosolisation when difficulties arise during the intubation.

HE METHOD

A HEPA filter is connected to the top of the ETT, which is preloaded in the tube-guiding channel of the VL. The HEPA filter stops the aerosol transmission via the ETT, while the intubator locates the tracheal inlets on the screen of the VL. After the ETT is placed properly into the trachea, capnography is connected between the HEPA filter and the ventilator to verify the tracheal intubation (figure 1).

SHE METHOD

This method can be applied to all types of non-channelled VLs. The SHE method is a combination of a swivel-elbow with a seal port, a HEPA filter, an ETT and

a bougie. Preload the bougie inside an ETT; we suggest lubricating the bougie to facilitate insertion and withdrawal. The top of the ETT is connected with a swivel-elbow and a seal port (figure 2A). The seal port lets the bougie pass through and seal the top of the ETT from aerosol transmission (figure 2B). The swivel-elbow is connected to a HEPA filter. After the bougie is inserted into the trachea, the ETT is railroaded over the bougie to the proper depth; 'clicks' during the advance of the bougie along the trachea rings and the 'hold-up' when the tip of the bougie reaches the main bronchus can help to confirm correct placement while wearing PPE.⁶ Then the bougie is removed. The top cap of the seal port is closed. Capnography is connected between the HEPA filter and the ventilator to check correct placement. Carefully remove the bougie from the ETT in order to prevent any fluid aerosolisation as it exits the seal port of the swivel-elbow. We have created



Figure 3 Negative pressure barrier.



a negative pressure barrier by attaching a huge plastic bag to wall suction during removal of the bougie from the ETT. However, sufficient practice is crucial (figure 3).

Of importance:

1. Intubation should be performed using rapid sequence intubation so that the patient is paralysed. Having the patient apnoeic during intubation will prevent further unnecessary aerosolisation and achieve optimal conditions for intubation.
2. In using the HE method, intubators must be familiar with using a channelled laryngoscope as this scope is sometimes more difficult to work with especially if the patient has more anterior vocal cords as there is no introducer in the ETT.
3. Although the SHE bougie method may be applied to direct laryngoscopy, it is potentially dangerous and should be avoided while managing patients with a contagious disease such as COVID-19.
4. SHE methods may not be suitable for hyperangulated video laryngoscope (HAVL). The angulation of bougie tip is only 30 degrees and is not sufficient for HAVL with a blade angulation around 50–60 degrees and may increase the difficulties of successful intubation.

Thus far, we have applied the HE and SHE methods on 10 patients during our practice in the emergency department and believe it has been useful in reducing aerosol transmission risk.

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