

Article type : Letter

TITLE PAGE

Manuscript title:

Novel technique for safe tracheostomy during COVID-19 pandemic using Evone® flow-controlled ventilation system.

Running title:

Tracheostomy with Evone® ventilation system

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Text

Acute lung injury resulting from SARS-CoV-2 infection has led to high number of prolonged invasive mechanical ventilation. Role and timing of tracheostomy for patients requiring critical care for coronavirus disease 2019 (COVID 19) remains unclear. So far, published data on early versus late tracheostomy are conflicting. Actual recommendations suggest that this procedure should be considered in patients with COVID 19 when mechanical ventilation is anticipated to be over 10 to 15 days.¹

Tracheostomy is a highly aerosol generating procedure and exposes health care providers to viral contamination via air droplets.² Recommendations have been suggested for safe surgical tracheostomy during COVID-19 pandemic by several societies.^{3,4,5,6} In order to ensure maximal protection to staff performing the procedure, full personal protective equipment (PPE) is strongly recommended.⁷ This includes N95 mask, goggles or face shields, surgical gown, and gloves. The use of such equipment may affect communication, visibility and other non-technical skills.⁸ However, it remains essential to prevent health care workers contamination. In addition to PPE, tracheostomy should be performed in a negative-pressure room. Utilization of techniques which minimize aerosolization is recommended when performing tracheostomy.

We describe a tracheostomy technique for patients requiring prolonged mechanical ventilation. We aim to minimize aerosol contamination, using flow-controlled ventilation (FCV) provided by a new ventilator, the Evone® (Ventinova medical B.V.), through a specifically designed cuffed endotracheal tube, the Tritube® (Ventinova Medical B.V.).⁹

FCV system is designed to maintain constant flow during inspiration and expiration. The main specificity of this ventilator is that it provides active expiration. Tritube® is a 40 cm long, narrow-bore tube (outer diameter = 4.4mm) with three independent lumens for, respectively, pressure measurement, ventilation and cuff inflation.

Patient, already intubated and sedated, is anesthetized and a deep neuromuscular block is ensured. Once ventilation and fresh gas flow are stopped at end expiration, the endotracheal tube (ETT) is cut at its proximal end. This allows easier insertion of the Tritube® through the standard ETT at the desired depth.

After checking both tubes' length markings, the Tritube® is introduced into the ETT and is pushed down as caudally as possible into the trachea, in order to protrude the distal end of the ETT. Tritube® cuff is inflated. Ventilation with Evone® FCV system through Tritube® can then be started. (Fig 1)

ETT cuff can be deflated safely and lifted above the vocal cords to allow a good working space for the surgeon. (Fig 2)

Trachea is opened by the surgeon without risk of aerosolization, as Tritube® cuff is inflated and isolates the ventilated lower airways. The small diameter of the Tritube® allows the tracheal cannula to be inserted while the Tritube® is still in place. Cannula's cuff can be inflated and patient is ventilated through the cannula with conventional ventilator. (Fig 3)

After deflating its cuff, Tritube® can be removed with the ETT around it. Tritube® passes easily beside the inflated tracheostomy cannula cuff. (Fig 4)

Safety profile and effectiveness of FCV with Evone® system and Tritube® has been demonstrated by Meulemans and coll. No adverse effects had been described.^{9,10}

The technique we suggest has many advantages.

First, it decreases dramatically the aerosolization of viral particles during the tracheostomy as closed system of ventilation is provided during the entire surgical procedure.

Second, apnea time is decreased as patient is ventilated even during cannula insertion. This allows safe conduction of tracheostomy in very hypoxic patient.

Third, this technique could also be performed for percutaneous tracheostomy as it allows safe fiberoptic visualization during critical moments. Tritube® diameter allows easy fiberoptic while Evone® insures ventilation with minimal aerosolization.

The main goal of this letter was to present a safe tracheostomy technique protecting health care providers from aerosolization during COVID-19 pandemic. Further studies should be conducted regarding the use of FCV with Tritube® as a protective tool in ENT surgery for operating room teams.

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5. FIGURE LEGENDS

Figure 1:

Introduction of the Tritube® through the endotracheal tube

Figure 2:

Endotracheal tube is lifted above the vocal cords

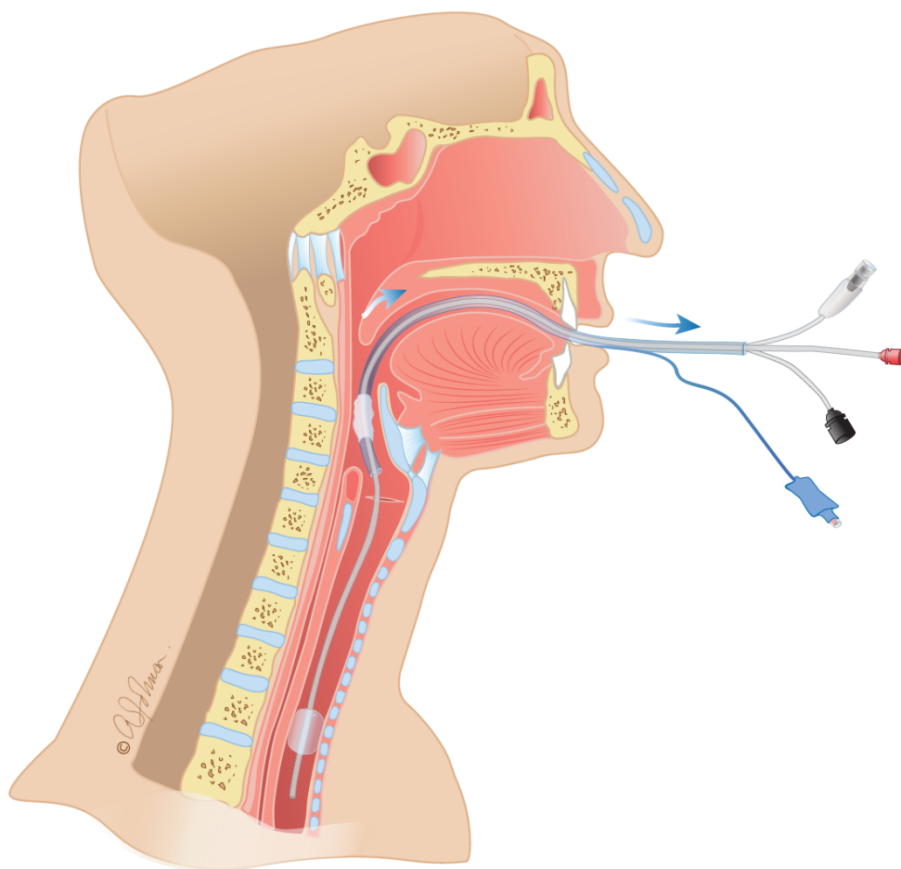
Figure 3:

Insertion of the tracheostomy cannula

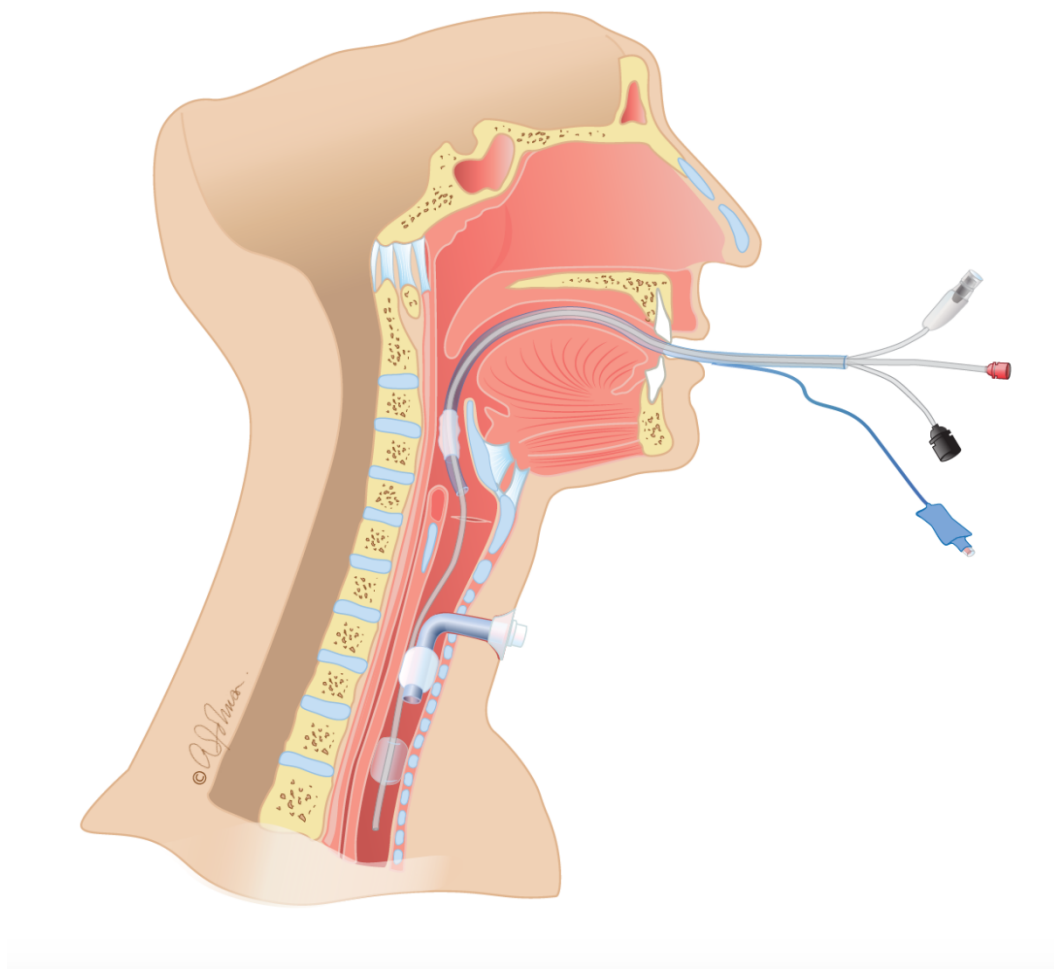
Figure 4:

Tritube's® removal, together with endotracheal tube

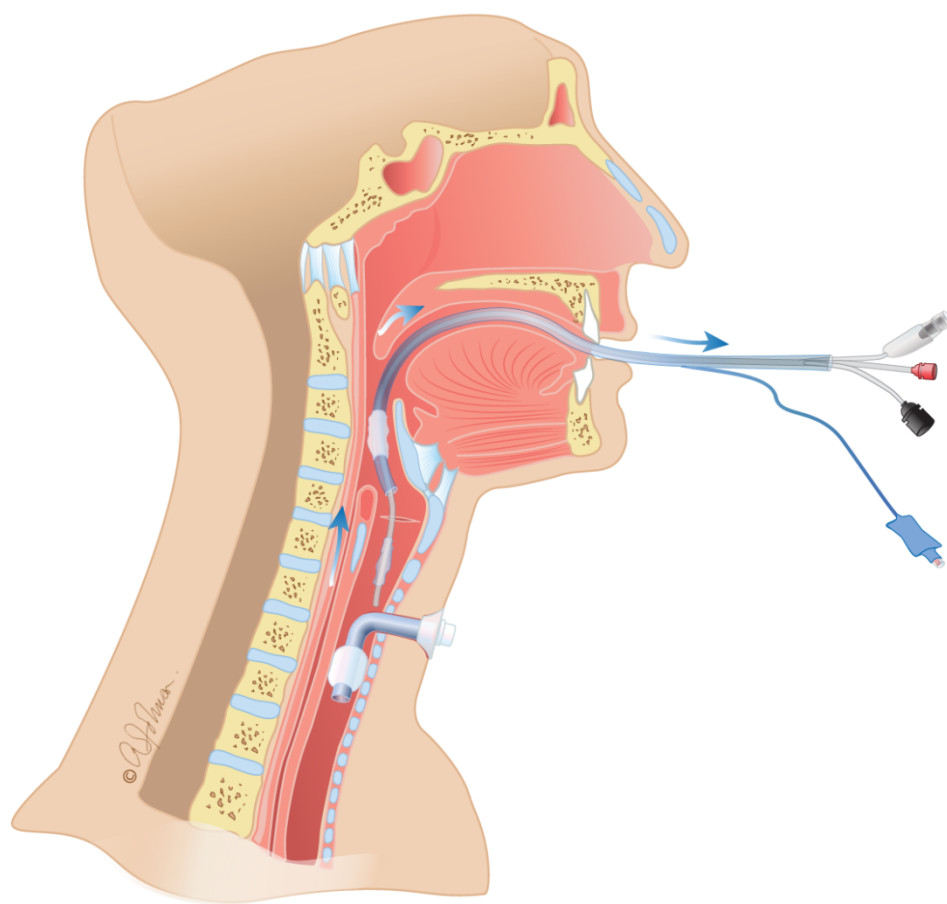
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