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Suction above cuff endotracheal tube can reduce ventilator-associated pneumonia in COVID-19 patients

To the Editor

Ventilator-associated pneumonia (VAP) is a type of pneumonia classified as a nosocomial infection associated with mechanical ventilation which occurs 48-72 hours after endotracheal intubation [1]. VAP is the second most common infectious complication of hospitalization accounting for approximately 10% to 25% of patients who require invasive mechanical ventilation for over 24 hours [2, 3]. It is characterized by a mortality rate of 40%, but in patients whose etiological factor was a moisture-resistant microorganism, the mortality rate may be as high as 70%. VAP is mainly the result of the mechanical transfer of microorganisms from the upper respiratory tract to the bronchi during intubation, mechanical damage to the mucosa of the respiratory tract, and translocation of bacterial flora from the nasopharynx and stomach.

Under normal conditions, the human body prevents various infections through the cough reflex, bronchial secretions, and/or humoral and cellular immunity. In COVID-19 patients, humoral and cellular immunity is significantly reduced. In addition, an intubated and flaccid patient cannot perform a bronchial tree toilet due to suppressed natural defense reflexes. After just a few hours, a bacterial filter is formed on the surface of the cuff sealing the endotracheal tube which, each time an over-intubation or inadequate ventilation occurs, reaches the bronchial tree and then the patient's lungs. The use of classic tidal volumes (10–12 mL/kg) and standard peak pressures (35–45 cm H_2O) leads to ventilatory-induced lung injury, which favors the development of VAP. Considering the above risk factors, it is important to use a fixed suction above endotracheal tube cuff which may reduce the risk of bacteria that accumulate there being transferred to the bronchi. Suction above cuff endotracheal tubes (SACETT) are available on the market and are used in intensive care conditions. However, in patients with suspected or confirmed COVID-19, this type of endotracheal tube should be considered at the pre-hospital stage if the patient's condition requires respiratory device protection. Then, the risk of over-intubating the patient by SACETT will be minimized. Tubes with suction above the cuff allow for the intermittent aspiration of these secretions with high pressure or continuously with pressures up to 20 mm Hg. They maintain the space above the cuff free of secretions and reduce the occurrence of microaspirations.

According to the Yuzkat and Demir studies [4], the use of SACETT reduces the incidence of PIV as well as the incidence of agitation, sore throat, and difficulty swallowing. The advantage of SACETT over the standard endotracheal tube is also shown in studies by other authors, including Jena *et al.* [5]. In turn, Kelley *et al.* [6] calculated that it is necessary to use tubes with suction above the cuff in 33 patients to prevent one episode of VAP, which shows that this protocol would be cost effective.

However, as with standard low-lumen catheters, the use of SACETT with a single suction

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DOI: 10.5603/ARM.a2021.0025
Received: 14.11.2020

ISSN 2451–4934

Figure 1. Example of a multiple suction port in the NeVap aspire subglottic suction endotracheal tube

port may clog the opening and make it difficult or impossible to perform above cuff suction. Due to the above, it seems reasonable to use intubation tubes equipped with multiple suction ports. An example of such a tube is the NeVap Aspire Subglottic Suction Endotracheal Tube (Nevap Inc., San Jose, CA, USA; Figure 1). Thanks to the use of the multiple suction port, it is possible to distribute the suction pressure over a larger area thus reducing the risk of damage to the surrounding tissues and reducing the risk of port obstruction, therefore making the suction of secretions more effective.

Conflict of interest

None declared.

References:

1. Souza CR, Santana VT. Impact of supra-cuff suction on ventilator-associated pneumonia prevention. Rev Bras Ter Intensiva. 2012; 24(4): 401–406, doi: 10.1590/s0103-507x2012000400018, indexed in Pubmed: 23917940.
2. Klompas M, Magill S, Robicsek A, et al. CDC Prevention Epicenters Program. Objective surveillance definitions for ventilator-associated pneumonia. Crit Care Med. 2012; 40(12): 3154–3161, doi: 10.1097/CCM.0b013e318260c6d9, indexed in Pubmed: 22990454.
3. Vijai MN, Ravi PR, Setlur R, et al. Efficacy of intermittent sub-glottic suctioning in prevention of ventilator-associated pneumonia- A preliminary study of 100 patients. Indian J Anaesth. 2016; 60(5): 319–324, doi: 10.4103/0019-5049.181592, indexed in Pubmed: 27212718.
4. Yuzkat N, Demir CY. Effect of using the suction above cuff endotracheal tube (SACETT) on postoperative respiratory complications in rhinoplasty: a randomized prospective controlled trial. Ther Clin Risk Manag. 2019; 15: 571–577, doi: 10.2147/TCRM.S200662, indexed in Pubmed: 31114211.
5. Jena S, Kamath S, Masapu D, et al. Comparison of suction above cuff and standard endotracheal tubes in neurological patients for the incidence of ventilator-associated pneumonia and in-hospital outcome: A randomized controlled pilot study. Indian J Crit Care Med. 2016; 20(5): 261–266, doi: 10.4103/0972-5229.182196, indexed in Pubmed: 27275073.
6. Kelley SD. Number needed to treat for subglottic secretion drainage technology as a ventilator-associated pneumonia prevention strategy. Crit Care. 2012; 16(5): 446, doi: 10.1186/cc11464, indexed in Pubmed: 22958574.