

# Regulation of Tracheal Cuff Pressure



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### To the Editor:

The study by Marjanovic et al<sup>1</sup> published in this issue of *CHEST* is the first multicenter randomized controlled study to address the efficacy of a device for the continuous regulation of tracheal cuff pressure. Therefore, its authors should be commended. In trauma patients who are ventilated mechanically, there was no added value as compared with standard care (ie, manual intermittent adjustment of tracheal cuff pressure at least tid) of the use of such a device: neither the primary outcome (the incidence of ventilator-associated pneumonia [VAP]) nor secondary outcomes were positively impacted by the device. Yet, aspiration of oropharyngeal content, which is expected to be limited by an intensive regulation of tracheal cuff pressure, is considered widely as a major contributor to VAP pathophysiologic condition. Therefore, what are the reasons for this lack of positive effect of continuous regulation of tracheal cuff pressure? We have drawn up some hypotheses for this somewhat unexpected finding.

First, the tested device (Nosten; Leved, Paris, France) is bulky, more than its latest model (Nosten2; Leved), and its connecting line is relatively short. Thus, in the study by Marjanovic et al,<sup>1</sup> the device was disconnected frequently (3 hours; interquartile range, 1 to 8 hours) during, for instance, nursing care that requires lateral decubitus or intrahospital transports (eg, to the imaging facility or the operating room), which are frequent in trauma patients. However, such procedures are particularly at-risk of aspiration of oropharyngeal content.<sup>2</sup> In other words, it is likely that the device was disconnected during the crucial moments during which its presence would have been desirable.

Second, is the Nosten device really superior to standard care for the prevention of cuff underinflation? This is a mandatory prerequisite if one expects to observe a reduction in VAP incidence. As a secondary outcome of a previous single-center study, yes; the Nosten device was efficient in controlling tracheal cuff pressure.<sup>3</sup> Unfortunately, this critical issue was not addressed in the study by Marjanovic et al.<sup>1</sup> Actually, the aforementioned frequent disconnections of the device are likely occasionally to have caused its misuse through air leakage related to errors in the position of the three-way stopcock and/or default in device recalibration.

Device misuse-associated tracheal cuff pressure underinflation could have counterbalanced its possible benefit. In our opinion, the findings of Marjanovic et al<sup>1</sup> may not apply to less cumbersome devices, that is, devices less frequently disconnected.<sup>4</sup>

Last, if future studies confirm that continuous and intermittent regulation of tracheal cuff pressure are equivalent in preventing VAP, this would question the main component of the current paradigm of VAP pathophysiologic condition (aspiration of oropharyngeal content) and encourage the exploration of other pathways.<sup>5</sup>

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## Response



### To the Editor:

We thank Lakhali et al for their great interest in our study.<sup>1</sup> The authors suggest frequent disconnection of the pneumatic device from the tracheal cuff to explain failure of the intervention. Overall, 778 device interruptions were recorded during the study (three per

patient on average), which corresponds to only 1.4% of mechanical ventilation time, mainly (65%) for patient transfer to the radiology department or the operating room. These short periods of disconnection could have led to episodes of under-inflation of the tracheal cuff and thus aspiration of the oropharyngeal content; however, we do not believe that they alone can explain the lack of benefit of the intervention.

Transporting mechanically ventilated patients carries a high risk of aspiration,<sup>2</sup> and device disconnections occasionally may cause its misuse through air leakage related to errors in the position of the three-way stopcock and/or default in device recalibration. Nevertheless, none of these situations were reported by nurses caring for the patients. We agree with Lakhali et al that the use of smaller, transportable continuous tracheal cuff pressure control devices, which were not available at the time we began our study, should be preferred to avoid device disconnections during patient transport or care, although no studies confirming their efficacy have yet been published.<sup>3,4</sup>

Finally, if our results are confirmed by others, the authors encourage the exploration of pathways other than inhalation of oropharyngeal contents as a starting point for the development of ventilator-associated pneumonia (VAP). Another hypothesis, also discussed in the article, is the timing of onset of aspiration. Severe trauma patients are often admitted to the ICU several hours after tracheal intubation, which is the time to transfer them from the scene to the hospital, to carry out initial assessment and eventually to be treated in the operating room. Aspiration of oropharyngeal secretions before placement of the continuous cuff pressure control device cannot be excluded.

Health care-associated infections remain a major burden of patients in critical care, with VAPs being the most common and among the ones most frequently associated with poor outcome. Moreover, VAPs accounts for more than one-half of the antibiotic treatments prescribed in the ICU and favor the appearance of bacterial resistance. Fighting them is crucial, with the use of a multifactorial approach combining all the components likely to prevent them.<sup>5</sup> Continuous tracheal cuff pressure monitoring has theoretic advantages but, in the absence of clinical validation based on robust endpoints, cannot be recommended routinely.

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## Is It a Real Obesity Paradox?



### To the Editor:

We read with great interest the article by Nseir et al<sup>1</sup> published in *CHEST* (June 2021). This study is prominent because the authors focused on obesity, which is a common and one of the most serious health conditions. It is an important risk factor associated with morbidity in ICUs. In addition, ventilator-associated pneumonia (VAP) is one of the most common ICU-acquired infections and can lead to increased mortality, highlighting the clinical relevance of this study. Although informative, we have two concerns regarding the validity of this study.

Our first concern is the misclassification of the exposure variable. Based on the BMI, this study classified

overweight, normal weight, and even underweight as nonobese. However, previous studies have shown that, apart from obesity, underweight is associated with an increased risk of pneumonia, indicating a U-shaped relationship between BMI and pneumonia.<sup>2</sup> Such a misclassification may lead to underestimating the hazard ratios of obesity for the incidence of VAP, resulting in a substantial reduction in internal validity. Therefore, the authors should have considered other weight categories, including underweight, when categorizing patients based on BMI. For example, the definitions of weight categories by the World Health Organization may be suitable (underweight,  $\leq 18.4$ ; normal weight, 18.5-24.9; overweight, 25.0-29.9; and obesity,  $\leq 30.0$ ).<sup>3</sup>

Our second preoccupation concerns the external validity of the results. Based on the nature of the post hoc analysis of a randomized controlled trial, the enrolled patients in this study are highly selected.<sup>4</sup> This means that the enrolled patients, including the obese, may have better conditions than those in the real world. In addition, the prevalence of VAP at 28 days was approximately 9%, which is the lower limit value when referring to previous studies,<sup>5</sup> thereby reducing the external validity of the results.

In summary, “the obesity paradox” by the authors’ suggestion might be based on reduced internal validity due to misclassification of BMI and the insufficient external validity due to usage of the data from randomized controlled trials. Although this study is valuable because the authors clarified an interesting relationship between obesity and VAP for the first time, caution should be exercised when interpreting the study results.

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