



Noninvasive auto-titrating ventilation (AVAPS-AE) versus average volume-assured pressure support (AVAPS) ventilation in hypercapnic respiratory failure patients: comment

Fatma Yıldırım¹ · Edoardo Piervincenzi² · Güniz Meyancı Köksal³ · Antonio Esquinas⁴

Received: 18 May 2018 / Accepted: 30 May 2018 / Published online: 6 June 2018
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Dear Editor,

We have read with great interest Gursel et al.' study [1] where non-invasive auto-titrating ventilation (AVAPS-AE) and average volume-assured pressure support (AVAPS) ventilation in hypercarbic patients had been compared. AVAPS is not a newly invented mode, and AVAPS-AE has been a commercially available modality used since 2015, also they do not fit traditionally defined “modes.” Rather, they can be described as variations of already available non-invasive mechanical ventilation (NIMV) modes of continuous positive airway pressure (CPAP), bilevel positive airway pressure (BIPAP) and pressure support.

In AVAPS, if the targeted tidal volume is not reached, the ventilator takes over to provide necessary pressure support to reach the goal [2]. In AVAPS-AE, the ventilator automatically increases the defined pressure support to reach the target tidal volume together with increasing EPAP. As defined in earlier studies, the ventilator adjusts for the target in every cycle. [3] Thus, in both modes, there are no significant differences between two devices, and both are suitable for use in hypercarbic patients.

The authors found that 10 mmHg or 10% reduction in PaCO₂ levels occurred in a similar number of patients in both modes, with PaCO₂ reduction time being shorter in

AVAPS-AE group. This is a controversial issue that requires further investigation for a proper clinical comparison.

First of all, patients with hypercapnic respiratory failure often have a very low level of PaO₂ due to a myriad of reasons, and an exacerbation of chronic obstructive pulmonary disease (COPD) leads to further respiratory muscles fatigue with a worsening of respiratory function. Single limb machines (as TRILOGY 100 used in their patients) may be responsible for a larger share of gas rebreathing if an adequate PEEP level has not been set. In “acute” conditions like a decompensated COPD, an increased WOB can be counteracted by increasing inspirator positive airway pressure (IPAP) and EPAP, as is evident in the AVAPS-AE group of the study in which patients showed a better compliance to the ventilatory mode [4].

Secondly, while a statistically significant difference in maximum IPAP and mostly in maximum EPAP reached was found between the two groups, the arterial blood gas values (most of them were not decompensated) were found to be quite similar. This can explain the reduction in respiratory frequency and the improvement of tidal volume (two determinant components in WOB) being quite the same in both groups despite a better patient satisfaction in the other group [5]. In the authors' study, the initial PaCO₂ levels, pH and HCO₃ levels of the patients were 62–69 mmHg, 7.34 and above 30 mEq/l, respectively, and indications to start NIMV treatment were not clearly described.

Thirdly, in their study a single limb machine was used that had an intentional leak. This may be the underlying reason why a higher level of PEEP reached by AVAPS-AE led to a higher tidal volume being reached, but also produced higher air leaks. Regarding this, a further investigation is required to observe if higher air leaks (which may be caused by higher pressures) may change patient–ventilator synchrony.

Lastly, from a pulmonary mechanics point of view, a higher PEEP certainly could be helpful in patients with high

✉ Fatma Yıldırım
ftagassi@hotmail.com

¹ Intensive Care Unit, Dışkapı Yıldırım Beyazıt Research and Education Hospital, Ankara, Turkey

² Department of Anesthesiology and Critical Care, Università Cattolica del Sacro Cuore, Rome, Italy

³ Department of Anesthesiology and Reanimation, Cerrahpaşa Faculty of Medicine, Istanbul University, Istanbul, Turkey

⁴ Intensive Care Unit, Hospital Morales Meseguer, Murcia, Spain

body mass index, by counterbalancing the pressure above the thorax generated by the rib cage and soft tissues. Similarly, in patients with changes in airway resistance during sleeping, a software, which can modulate PEEP level, might be useful. It is still to be verified whether the continuous variation of EPAP in addition to the variation of IPAP may lead to some benefit in terms of mortality or in frequency of exacerbation.

Further randomized clinical trials are required to confirm the advantages of AVAPS-AE and its effectiveness in patients with hypercapnic respiratory failure.

Compliance with ethical standards

Conflict of interest The Authors declare that they have no conflict of interest.

Statement of human and animal rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent None.

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