Noninvasive Ventilation for Acute Hypercapnic Respiratory Failure: Is It the Same as in Hypercapnic Coma?

To the Editor:

I have read with interest the original article entitled, "Noninvasive ventilation for acute hypercapnic respiratory failure: intubation rate in an experienced unit."[1] In this paper, the authors prospectively evaluated 242 patients who received noninvasive ventilation (NIV) for acute hypercapnic respiratory failure in the presence of COPD or other causes not associated with COPD and for acute hypercapnic respiratory failure in the absence of chronic obstructive diseases. The authors found severe hypoxemia as an independent factor of failure in hypercapnic patients from any source. Alterations at the sensory level have been reported, and ventilatory settings do not influence the results.

I have some remarks on this study. The authors reported 31 (12.8% of all patients studied) hypercapnic coma patients either on admission (15 patients) or during the first 24 h (16 patients). The management of hypercapnic coma patients, which can be measured by the Glasgow coma scale[2] and the Kelly-Matthay scale,[3] differs from that of patients with an altered level of consciousness who have not reached hypercapnic coma, especially regarding the levels of pressure support used during the first hours or target volume.

The authors found no significant differences in the levels of pressure used between the two groups, with a support pressure of 9.2 ± 2.6 cm H_2O (NIV success) versus 9.4 ± 2.8 (NIV failure). Díaz et al[4] used BiPAP Vision or BiPAP S/T-D 30 (Philips Respironics, Murrysville, Pennsylvania), and inspiratory positive airway pressure (IPAP) was initially programmed at 12 cm H_2O and increased every 4 h, with an IPAP in the first hour of 17 ± 2 cm H_2O. Briones Claudett et al[5] reported an IPAP baseline of 19.82 in the bi-level positive airway pressure spontaneous/timed (BPAP S/T) group with average volume-assured pressure support. Therefore, the use of pressure levels in this study in hypercapnic coma patients must be considered independently of the pressure levels used in patients with impaired sensory level that are without hypercapnic coma because levels may be below those routinely used in daily practice.[6,7] In contrast, an underestimation of pressure support or IPAP levels in this subgroup of patients may affect early clearance of P_{CO_2} in the blood and especially in the cerebrospinal fluid, prolonging coma and maintaining intubation risk for these patients. Furthermore, the authors found no significant differences in the tidal volume (V_T): 475 ± 140 (NIV success) versus 415 ± 166.06 (NIV failure).

We found a significant improvement in quick minute volume in patients with hypercapnic coma[6] with rapid recovery of sensory level comparing the BPAP S/T-only group versus the BPAP S/T with average volume-assured pressure support group (BPAP S/T-only, 304 ± 60.6 vs 531.1 ± 63.6; BPAP S/T with average volume-assured pressure support, 298.6 ± 54.3 vs 617.6 ± 77.4; $P = .01$).

The rapid recovery of sensory level in these patients is also linked to an improvement in the exhaled V_T, which quickly reaches the levels required to maintain an appropriate V_T and correct hypoventilation, improving alveolar ventilation. The presence of secretions, which are essential in evaluating the failure prevention technique and endotracheal intubation, has not been evaluated. We believe that these assessments should be taken into account when analyzing these results.

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The author has disclosed no conflicts of interest.

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Noninvasive Ventilation for Acute Hypercapnic Respiratory Failure: Is It the Same as in Hypercapnic Coma?—Reply

In Reply:

We read with a great interest the comments made by Dr Killen H Briones Claudett concerning adjustments of ventilatory settings during noninvasive ventilation (NIV) to treat subjects with hypercapnic coma. In a recent original article published in the December 2013 issue of RESPIRATORY CARE,[1] we reported an overall intubation rate of 15% in a cohort of 242 subjects receiving NIV for acute hypercapnic respiratory failure of all origins. After adjustment, acidosis and severe hypoxemia after 1 h of NIV initiation were independently associated with NIV failure, whereas altered consciousness on admission and ventilatory settings had no influence on outcome. Altered consciousness was defined using the Richmond Agitation-Sedation Scale (RASS),[2] and in all of the subjects who had encephalopathy at admission (defined as RASS < 0), the rate