

NORMOCAPNIA FOLLOWING NONINVASIVE VENTILATION IN ACUTE AND CHRONIC VENTILATORY FAILURE IN COPD

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Noninvasive ventilation has been well established in COPD to unload the respiratory pump and improve arterial blood gases. Randomized studies show only a small decrease in arterial PCO_2 as a result of noninvasive ventilation. PCO_2 is largely ventilation dependent. We, therefore, attempted to decrease PCO_2 while on the ventilator and while breathing spontaneously to normal values and studied the effects of this therapy both in acute exacerbations and in chronic COPD. 107 patients (63% male) with a FEV1 below 70% presenting hypercapnia above 50mmHg (6.7kPa) during spontaneous breathing were investigated. The ventilator mode was free according to the choice of the therapist and the comfort of the patient. Mode and setting had to be changed if the therapeutic goal of normocapnia had not been achieved. The subgroups of acute exacerbated and chronic COPD were separated by pH (<7.35= acute), by HCO_3^- (<26 = acute) and by history (acute= history of recent deterioration).

Results: The following ventilator settings resulted: tidal volume 972 ± 137 ml, frequency 20 ± 2.2 (volume preset); inspiratory pressure 33.6 ± 14.2 mbar, frequency 19.7 ± 5.1 (pressure preset). The preference of volume preset ventilators resulted from insufficient maximal pressures of the pressure preset devices. 88.5% used nasal masks, 5.2% naso-oral and 6.3% individual interfaces. 83% became normocapnic while on NIV after 6.8 ± 5.7 days. The mean PCO_2 decreased from 64 ± 13 mmHg to 41 ± 6 mmHg ($P < 0.001$). After 4 weeks, 72% were normocapnic while breathing spontaneously ($P < 0.001$). The subgroups of acute exacerbation were: pH 28%, HCO_3^- 2% and history 68% (all indicators 2%). Normocapnia was independent from the subgroup.

Conclusions: The study proved that normocapnia can be achieved in COPD by NIV under both ventilator and while breathing spontaneously in chronic and acute disease.