Effect of an Open Nasal Cannula System (TNI) in hypercapnic respiratory failure in COPD patients

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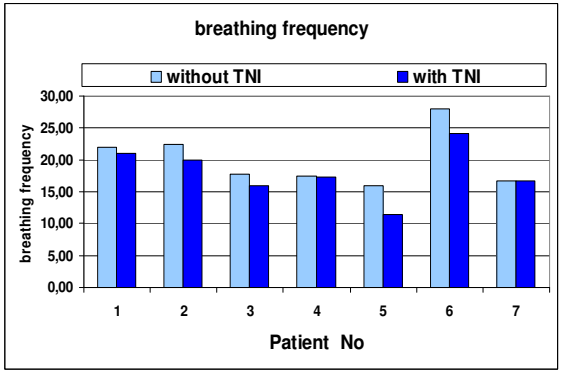
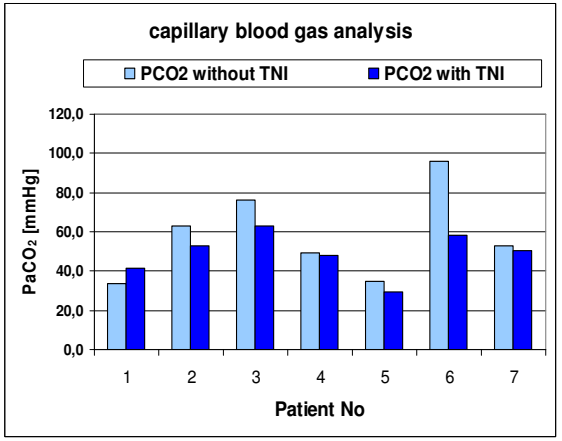
Introduction:

Transnasal Insufflation is a new technology recently introduced for the treatment of obstructive sleep apnea (OSA). Completely humidified air is insufflated with a high flow (20 l/min.) via the patients nostrils, and around 1/3 of the patients with OSA are effectively treated with this method. Non invasive positive pressure ventilation is a standard treatment in acute on chronic hypercapnic respiratory failure in COPD patients. While the positive results of this treatment in the acute phase of respiratory failure are demonstrated, the effects of a long term treatment are not clear. The adherence for chronic noninvasive ventilation in this group of patients is low. From theoretical considerations a high flow transnasal insufflation could reduce the dead space ventilation and consecutively the work of breathing.

Methods:

6 COPD patients and 1 patient with kyphoscoliosis (mean age 69.4 ± 15.5 years, BMI 25.4 ± 10.3 kg/m²) with a hypercapnic respiratory failure without acidosis were treated with 2l/min oxygen insufflation for 1 hour and the TNI system for another 1 hour on a general pulmonary ward. The respiratory rate was constantly monitored and capillary blood gas analysis was performed at the beginning and the end of each phase.





Results:

TNI reduced the breathing frequency from 20.0 ± 4.3 (oxygen) to 18.1± 4.1 (TNI) per minute ($p<0.05$). The capillary PCO_2 was reduced from 58.0 ± 22.5 mmHg (oxygen) to 49.1 ± 11.1 mmHg (TNI) ($p=0.09$).

Conclusion:

These first data show that during a short time trial in hypercapnic respiratory failure patients TNI reduced significantly the breathing frequency and the PCO_2 compared to a 2l/min standard oxygen therapy through a nasal cannula. Maybe a reduction in the dead space ventilation is the pathophysiologic mechanism responsible for this effect. Studies with a higher number of patients and longer treatment periods must follow in future.