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Effects of Nasal Insufflation on Arterial Gas Exchange and Breathing Pattern in Patients with Chronic Obstructive Pulmonary Disease and Hypercapnic Respiratory Failure.

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Abstract

High flow nasal insufflations (NI) can improve gas exchange and alleviate dyspnea in patients with acute respiratory failure. In the present study we investigated the effects of high flow nasal insufflations in COPD patients with chronic hypercapnic respiratory failure (HRF). Seventeen patients with severe COPD and HRF were recruited. We delivered a mixture of 20 L/min room air and 2 L/min O₂ through a nasal cannula either into both nostrils (NI) or into one nostril (Partial NI). Respiratory pattern and PaCO₂ responses under NI were compared with low flow oxygen of 2 L/min. High flow nasal insufflations led to a systematic reduction in respiratory rate from 19.8 ± 4.2 at baseline to 18.0 ± 4.7 during NI (p < 0.008) and 18.1 ± 5.2 breaths/min during Partial NI (P < 0.03). The mean group inspiratory duty cycle (T_I/T_T) and mean group PaCO₂ remained constant between all experimental conditions. Individual responses to NI were heterogeneous: six patients demonstrated marked reductions in respiratory rate (>20% fall from baseline), another group (n = 6) demonstrated no change in respiratory rate but marked reductions in arterial carbon dioxide of more than 8 mmHg. In conclusion, high flow (20 L/min) nasal insufflations of warm and humidified air during wakefulness for 45 min reduced respiratory rate without deterioration of hypercapnia. Our data indicate that high flow NI improved efficiency of breathing and may be used as an adjunct to low flow oxygen for preventing hypercapnic respiratory failure in severely ill COPD patients

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