



## Physiological response to intrapulmonary percussive ventilation in stable COPD patients.

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Intrapulmonary percussive ventilation (IPV) is a ventilatory technique that delivers bursts of high-flow respiratory gas into the lung at high rates, intended for treating acute respiratory failure and for mobilization of secretions. We performed a study, aimed at assessing the physiological response to IPV, on patients' breathing pattern, inspiratory effort, lung mechanics and tolerance to ventilation. Ten COPD patients underwent randomized trials of IPV through a face mask at different pressure/frequency combinations (1.2 bar/250 cycles/min; 1.8/250; 1.2/350; 1.8/350), separated by return to baseline (SB), using the IMP2 ventilator. In 5 patients we have also compared the physiological changes of IPV with those obtained during pressure support ventilation (PSV). Minute ventilation did not vary among the trials, but tidal volumes ( $V_T$ ) were significantly greater during 1.2/250, 1.2/350 and 1.8/350 compared to SB. The pressure time product of the diaphragm per minute (PTP<sub>di</sub>/min) estimate of the diaphragm oxygen expenditure was also significantly reduced during 1.2/250 and 1.8/250 (209  $\text{CmH}_2\text{O} \times \text{s}/\text{min}$  for SB vs. 143 and 125 for 1.2/250 and 1.8/250, respectively  $P < 0.05$ ), as well as dynamic intrinsic end-expiratory pressure (PEEP<sub>i,dyn</sub>). Similar reduction in PTP<sub>di</sub>/min were obtained also during PSV. Tolerance to ventilation and oxygen saturation were satisfactory and did not change during the different trials. In 5 normal subjects a prolonged apnea trial lasting  $> 2$  min was also performed, without any significant decrease in  $\text{SaO}_2$  or subjective discomfort. In conclusion, IPV was able to guarantee an adequate ventilation, while inducing a significant unloading of the diaphragm during the "low-frequency" trials.

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