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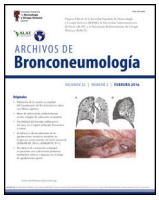

Letters to the Editor

Alveolar Emptying in Mechanical Ventilation☆

Ventilación de vaciamiento pulmonar

To the Editor,

Non-invasive mechanical ventilation (NIV) has revolutionized the treatment of patients with acute, chronic, and chronic exacerbated respiratory failure. In the NIV context, bi-level pressure ventilation stands out clearly above other ventilatory modalities such as volume-controlled ventilation or less popular systems such as synchronized intermittent mandatory ventilation.[1] In NIV, the end-expiratory pressure setting is chosen mainly to increase functional residual capacity, improve lung compliance, improve alveolar recruitment, and to counterbalance auto-positive end expiratory pressure (auto-PEEP). Other important benefits include the positive effects on hemodynamics and the prevention of rebreathing. Inspiratory pressure levels, on the other hand, are aimed at relieving the mechanical burden of fatigued inspiratory muscles, permitting them to rest by taking charge of the patient's ventilation.[2]

Different ventilatory strategies have been described in the past that define the rational use of NIV in certain clinical scenarios. For example, "lung-protective ventilation" alerts physicians to the risk of using high volumes and pressures in lungs with areas of variable compliance, as occurs in respiratory distress. This allows us to prevent such phenomena as atelectrauma and volutrauma.[3] "High intensity ventilation", in contrast, has been defined as an appropriate ventilation strategy in patients with chronic obstructive pulmonary disease (COPD) who are hypercapnic when stable.[4] This ventilatory strategy has been shown to decrease mortality when PaCO2 is normalized or at least reduced by 20%, and is well tolerated by patients.[5]

A paradoxical situation occurs in the case of patients with COPD exacerbation and severe air trapping. These patients typically show signs of hyperinflation, with diaphragmatic flattening, rib horizontalization, increased retrosternal air, and finally auto-PEEP, that causes early airway occlusion. Extra air is the only thing that the lungs of these patients do not need, and it is vital to initiate strategies to facilitate lung emptying. COPD patients naturally learn to prolong their expiration and to breathe through pursed lips to increase pressure in the mouth, thus reducing the pernicious effects of auto-PEEP. The main aim, then, of NIV in patients such as these must be to promote lung emptying rather than ventilation of the lung in the strict sense. Air can only be introduced into a lung that has been previously emptied. Regulating positive expiratory pressure from the ventilator to counter-balance the patient's auto-PEEP is the basic ventilatory strategy in patients with COPD and air trapping. This ventilatory paradox, the aim of which is to improve the expulsion of air from the lung, rather than to introduce a tidal volume into the lung (normally the essence of ventilation), should be seen as lung emptying ventilation. Lung emptying improves alveolar ventilation experienced by the patient, and in our opinion, it is time that this ventilatory strategy had its own name: "alveolar emptying ventilation".

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