

GLOBAL APPROACH TO RESPIRATORY FAILURE IN COPD PATIENTS

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Severity of exacerbations of chronic obstructive pulmonary disease (COPD) ranges from a mild increase of usual symptoms to overt ventilatory failure (ARF) (1), represented by a rise in PaCO₂ above 45 mm Hg or above previous stable hypercapnia, if present, and by the consequent respiratory acidosis (pH < 7.36) (2,3), resulting in a significant mortality that ranges between 6% to 26% in hospitalised patients. In patients with ventilatory failure, optimal medical therapy and adequate oxygenation can be insufficient, and ventilatory assistance can be required in presence of unbearable breathlessness at rest, signs of respiratory distress (tachypnea with a respiratory rate > 30 breaths/min, evident use of accessory respiratory muscles, paradox breathing), and laboratory findings of worsening of hypercapnia and acidosis.

The aims of mechanical ventilation, whatever modes and settings are selected, are 1) to support the overloaded ventilatory pump, 2) to improve arterial blood gases and pH, 3) to relieve dyspnoea and unload the respiratory muscles, 4) to “buy time” for the patient, by allowing adequate minute ventilation notwithstanding a failing ventilatory pump, until the causes of the exacerbation are resolved by medical therapy. Mechanical ventilation can be administered in different modes: 1) invasively through an endotracheal tube bypassing the upper airways through nasal-oro-tracheal tubes, tracheostomy or laryngeal cannulae (MV), and 2) noninvasively through interfaces applied externally on the body surface (NIMV). NIMV can be delivered in the form of positive pressure ventilation (NPPV) through nasal/face masks and helmets, or of negative pressure ventilation (NPV) putting the patients inside an iron lung or by applying ponchos or cuirasses.

The indications of starting some form of ventilatory assistance and the choice between conventional MV and NIMV, as well as the mode and settings of mechanical ventilation depend not only upon the severity of the exacerbations and respiratory acidosis, but also by many other factors such as the timing of the intervention, the characteristics of the patients, the skill of the team, the available monitoring facilities etc(4-6). Notwithstanding the complexity of this clinical problem, there is now little doubt that NIMV is an effective treatment for ventilatory failure resulting from acute exacerbations of chronic obstructive pulmonary disease (COPD), since a number of randomised controlled trials and at least four meta-analyses more than strongly support this evidence(7-10). As a matter of fact, NIMV has been shown to reduce the need for endotracheal intubation (ETI) and MV, with a concomitant improved survival, reduced complication rates and length of both Intensive Care Unit (ICU) and hospital stay(8-10), if compared with standard medical therapy. It is also noteworthy the higher rate infectious complications observed during MV compared to NIMV(11-14), since it may play a key role in worsening survival and ICU length of stay. On the basis of the published evidence, it has been suggested to define NIMV as the gold standard mode of ventilatory support for exacerbations of COPD, with ETI and MV regarded as second-line therapy(15). Potential advantages and disadvantages of NIPPV are mostly linked to the patient-ventilator interface (i.e. the mask). Among the advantages there is the possibility to deliver the ventilator assistance intermittently; ventilation outside ICU is possible; patients can drink and eat normally; communication with family and staff

is possible. By contrast, NIPPV is considered less effective because of mask leaks; masks may make the patient uncomfortable or claustrophobic; facial pressure sores may appear after prolonged NIPPV; airways are not protected; there is not direct access to bronchial tree for suctioning secretions. The place where to perform NIPPV depends on the severity of ARF, ranging from the medical ward to the ICU, according to the increasing need for close monitoring and probability to require intubation. Anyway, staff expertise is more important than location. Finally, it has to be stressed that NIPPV should be considered as a means of preventing tracheal intubation rather than as an alternative.

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