

Noninvasive Versus Invasive Ventilation in COVID-19 One Size Does Not Fit All!

To the Editor

The application of noninvasive ventilation (NIV) in the management of acute respiratory distress syndrome (ARDS) continues to be controversial. As evidence increases in favor of NIV usage in this setting, the subpopulation of patients who might benefit NIV remains still elusive. As clinicians who daily encounter this dilemma, we would like to briefly critique the current approach in coronavirus disease 2019 (COVID-19) that appears to undermine the role of NIV by recommending a low threshold for intubation.¹

Clinical Benefits of NIV

The Large observational study to UNDERstand the Global impact of Severe Acute respiratory Failure (LUNG SAFE) study, a large multicenter study, demonstrated that there is no significant difference in intensive care unit (ICU) and hospital mortality rates of patients with ARDS receiving NIV or mechanical ventilation, when ARDS severity, demographic characteristics, and associated comorbidities of both treatment groups were matched. This study showed the rate of mortality and NIV failure in the NIV group correlated with the severity of the patient's respiratory failure.² An earlier multicenter study by Antonelli et al³ showed that an early 1-hour NIV in ARDS patients on ICU admission could be helpful to clinically stratify them and avoid unnecessary intubation in more than half of the patient population.

Exaggeration of NIV Disadvantages

The main concern raised against the application of NIV in the setting of viral pneumonia is the potential for aerosol dispersion. Cheung et al⁴ studied the efficacy of NIV and the risk of disease transmission on 20 patients with positive serology for severe acute respiratory syndrome (SARS) virus treated by NIV and 105 health providers taking care of these patients. None of 102 health care providers who did the serologic test showed positivity for SARS.

Atypical Features of ARDS in COVID-19

Although it is still early to speak of an atypical ARDS in COVID-19, results of the early observations are in this line. A higher level of pulmonary compliance and shunt fraction is seen in COVID-19 patients with severe ARDS compared to the expected levels

of ARDS from other causes.⁵ An early study from Wuhan, China, showed an recruitment to inflation ratio (R/I ratio) lower than 0.5 in >80% of COVID-19 patients with severe ARDS, suggesting a significantly poor pulmonary recruitability in COVID-19.⁶ Disrupted vasoregulation due to vascular insult has been suggested to be the cornerstone of poor oxygenation in the early stages of ARDS in COVID-19. Thus, pursuing the common treatment approaches of applying high levels of positive end-expiratory pressure (PEEP) may accentuate underlying microvascular injury and contribute to a worse outcome.⁷ Until we learn more about the pathophysiology, it may be wise to apply intubation and mechanical ventilation at the earliest signs of NIV failure or initially in those patients in whom failure of NIV is highly predictable.

Disadvantages of Invasive Ventilation

The risk-benefit evaluation of invasive versus NIV should take into account the complications associated with mechanical ventilation, such as ventilation-induced lung injury, ventilation-acquired pneumonia, and finally a difficult weaning from mechanical ventilation.

In summary, we suggest that there is a selected subpopulation of COVID-19 ARDS patients with more favorable demographic characteristics and a lower extent of comorbidities who may benefit from an initial, closely monitored NIV trial, using newer NIV systems with a minimum air leak and functional expiratory filters, instead of being intubated based purely on the diagnosis and hypoxemia.

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DOI: 10.1213/ANE.0000000000004943