

## Findings from the COVID-VENT Trial



Many patients with COVID-19-associated acute respiratory failure fulfil the criteria of acute respiratory distress syndrome (ARDS) and require invasive mechanical ventilation. Therefore, it is important to understand the features of gas exchange abnormalities, respiratory mechanics and lung recruitability in these patients to provide an appropriate adjustment of positive end-expiratory pressure (PEEP), the tidal volume (VT) and the use of recruitment manoeuvres.

Two phenotypes of COVID-19-related ARDS have been proposed by Gattinoni et al. (2020) - the L-phenotype with low lung elastance and low recruitability and the H-phenotype with high lung elastance and high recruitability at the late stage. However, in other studies, COVID-related ARDS has been found to be similar to the primary non-COVID-related ARDS. Studies show high variability in optimum PEEP levels and lung recruitability in these patients during the first seven days of mechanical ventilation.

A study was conducted to explore respiratory mechanics and gas exchange, lung recruitability and risk of overdistension during the course of mechanical ventilation in COVID-19. The goal was to select optimum PEEP, evaluate recruitability and risk of volutrauma in patients with COVID-19-associated acute respiratory failure.

Critically ill mechanically ventilation patients with COVID-19 admitted to the ICU of Sechenov University were included in the study. The primary endpoints of the study were optimum PEEP level balanced between the lowest driving pressure and the highest  $\text{SpO}_2$  and the number of patients with recruitable lung on Days 1 and 7 of mechanical ventilation. Researchers also measured driving pressure at PEEP levels 14, 12, 10 and 8 cm  $\text{H}_2\text{O}$  with preset VT and with the increase of tidal volume by 100 ml and 200 ml at preset PEEP level. Static respiratory system compliance,  $\text{PaO}_2/\text{F}_i\text{O}_2$ , alveolar dead space and the ventilatory ratio were also calculated on days 1, 3, 5, 7, 10, 14 and 21.

Findings show that the optimum PEEP levels on day 1 were 11.0 cmH<sub>2</sub>O and 10.0 cmH<sub>2</sub>O on day 7. Positive response to recruitment was found in 27.6% of patients on day 1 and 9.2% of patients on day 2. The increase in PEEP from 10 to 14 cm H<sub>2</sub>O and an increase in VT by 100 and 200 ml resulted in a decrease in  $\text{C}_{\text{RS}}$  from day 1 to day 14. The ventilatory ratio in non-survivors was 2.2 and 1.0 in survivors on day 1. It decreased for survivors only on day 7.  $\text{PaO}_2/\text{F}_i\text{O}_2$  was 105.5 mmHg in non-survivors on day 1 and 136.6 in survivors.  $\text{PaO}_2/\text{F}_i\text{O}_2$  rose on day 3 and then between days 7 and 10 in survivors.

These findings show that lung recruitability was low in COVID-19 and decreased during the course of the disease. However, lung overdistension occurred at intermediate PEEP and VT levels. Gas exchange improvements in survivors mismatched  $\text{C}_{\text{RS}}$  after day 7.

Source: [BMC Anesthesiology](#)

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