

Effects of spontaneous breathing during ventilation in ARDS



Previous studies have suggested that the effects of spontaneous breathing during mechanical ventilation in acute respiratory distress syndrome (ARDS) may depend on ARDS etiology and severity, with possible beneficial effects in mild to moderate ARDS and harmful effects in severe ARDS. However, a new analysis did not find an association between ARDS severity, or etiology, and outcomes in patients with or without spontaneous breathing.

"Spontaneous breathing is common in patients with acute respiratory distress syndrome during the first 48 hours of mechanical ventilation. Spontaneous breathing is not associated with worse outcomes and may hasten liberation from the ventilator and from ICU," according to the research published in the journal *Critical Care Medicine*.

The findings support the use of spontaneous breathing in patients with ARDS independent of ARDS severity, although research authors note that the use of controlled ventilation indicates a bias towards use in patients with higher disease severity.

In patients with ARDS, lung protective mechanical ventilation (MV) is used to avoid ventilator-induced lung injury by limiting volume and pressure. Patient spontaneous breathing (SB) activity may impede efforts to limit tidal volume (VT) and suppressing SB with early neuromuscular blockade improves outcomes in patients with severe ARDS. However, SB in MV may cause or worsen acute lung injury if ARDS is severe and spontaneous effort is vigorous. Further, SB contributes to the transpulmonary pressure and may cause unsuspected overstretch of dependent lung during early inflation even when not increasing VT.

The authors performed this planned sub-study of the Large observational study to UNDERstand the Global impact of Severe Acute respiratory Failure (LUNG SAFE) to: 1) describe the characteristics and outcomes of patients with SB compared with patients with no SB during the first days of ARDS; and (2) to investigate whether the effects of SB on outcome depend on the severity of ARDS. Patients receiving MV during the study period were enrolled.

Of 12,906 patients screened for the LUNG SAFE study, 2,813 patients fulfilled ARDS criteria within 2 days of acute hypoxaemic respiratory failure (AHRF) onset. Of these, 1,756 patients had at least 2 days of MV and available data for the mode of MV and respiratory rate (RR) for the first 2 days. Data analyses revealed the following:

- SB was present in 67% of patients with mild ARDS, 58% of patients with moderate ARDS, and 46% of patients with severe ARDS.
- Patients with SB were older and had lower ARDS severity, Sequential Organ Failure Assessment scores, ICU and hospital mortality, and were less likely to be diagnosed with ARDS by clinicians.

In adjusted analysis, SB during the first 2 days was not associated with an effect on ICU or hospital mortality (33% vs. 37%; odds ratio, 1.18 [0.92–1.51]; $p = 0.19$ and 37% vs. 41%; odds ratio, 1.18 [0.93–1.50]; $p = 0.196$, respectively). SB was associated with increased ventilator-free days (13 [0–22] vs. 8 [0–20]; $p = 0.014$) and shorter duration of ICU stay (11 [6–20] vs. 12 [7–22]; $p = 0.04$).

The authors explain: "These findings need to be interpreted with caution. We did not assess the potential for patient-ventilator asynchrony. Asynchronies are common, occur in all modes of MV and are associated with worse outcome. The SB group was heterogeneous and included different MV modes. Different modes that allow SB may have different effects on lung aeration."

They also say that further research using better markers of respiratory drive and effort is needed to address the question whether SB during MV is beneficial or harmful in patients with ARDS. An adequately powered prospective randomised clinical trial should be conducted to compare controlled MV with pressure support ventilation (PSV) in patients with ARDS, stratified by severity and adjusting for all potential severity confounders.

Source: *Critical Care Medicine*

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