ICU
MANAGEMENT & PRACTICE

Mechanical Ventilation in Patients With Acute Brain Injury

Acute brain injury (BI) affects millions of patients each year, with high mortality rates and significant disability. Invasive mechanical ventilation is often required for the most severe cases of BI. These patients frequently experience respiratory complications, such as ventilator-associated pneumonia and acute respiratory distress syndrome, which can result in longer ventilator times and poor outcomes.

Accelerating the weaning process from mechanical ventilation and implementing strategies to prevent lung injury is crucial for critically ill patients. However, the optimal ventilation settings for BI patients remain uncertain. Recent guidelines and expert recommendations suggest using lung protective strategies, including low tidal volume (Vt) and moderate to higher positive end-expiratory pressure (PEEP) in BI patients.

A study examined how different ventilatory strategies may impact the outcomes of patients with acute brain injuries who require invasive mechanical ventilation. The study included observational and interventional studies published and compared the effects of different ventilatory strategies. Specifically, it examined the impact of using low tidal volume (Vt) less than 8 ml/kg of ideal body weight (IBW) versus Vt equal to or greater than 8 ml/kg of IBW, positive end-expiratory pressure (PEEP) less than or equal to 5 cmH2O versus PEEP greater than or equal to 5 cmH_2O, and the combined use of protective ventilation (using both low Vt and appropriate PEEP). The goal was to evaluate how these strategies influenced relevant clinical outcomes.

The primary outcome of the study was mortality at 28 days or in-hospital mortality. Secondary outcomes included the incidence of ARDS, the duration of mechanical ventilation, and the ratio of partial pressure of oxygen (PaO_2) to the fraction of inspired oxygen (FiO_2).

This meta-analysis incorporated eight studies involving a total of 5,639 patients. The analysis revealed no significant difference in mortality rates between low and high tidal volume strategies, low and moderate to high PEEP levels, or between protective and non-protective ventilation approaches. Additionally, low tidal volume, moderate PEEP, and protective ventilation did not affect the incidence of ARDS. However, protective ventilation did show improvement in the PaO_2/FiO_2 ratio during the initial five days of mechanical ventilation.

Overall, the findings of the study indicate that low tidal volume, moderate to high PEEP, and protective ventilation were not associated with mortality or a lower incidence of ARDS in patients with acute brain injury undergoing invasive mechanical ventilation. However, protective ventilation improved oxygenation and can be considered a safe option. Further research is needed to better understand the precise impact of ventilatory management on the outcomes of patients with severe brain injuries.

Source: Critical Care Medicine

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