VENTILATION PRACTICES IN SUBARACHNOID HEMORRHAGE: EXPLORING THE USE OF LUNG PROTECTIVE VENTILATION

Marhong, Jonathan1; Singh, Jeffrey2; Ferguson, Niall3.
1University of Toronto, Department of Medicine, Toronto, Canada; 2Toronto Western Hospital, Department of Critical Care & Neurocritical Care, Toronto, Canada; 3Toronto General Hospital, Department of Critical Care, Toronto, Canada.

Introduction: Acute respiratory distress syndrome (ARDS) is common following aneurysmal subarachnoid hemorrhage (SAH), but the influence of mechanical ventilator settings on its development is unclear. We sought to determine adherence to lung protective thresholds in ventilated patients with SAH and describe the association between ventilator settings and subsequent development of ARDS.

Objectives: In this study, we sought to determine adherence to lung protective thresholds in ventilated patients with SAH and describe the association between ventilator settings and subsequent development of ARDS.

Methods: We conducted a retrospective cohort study of consecutive patients receiving mechanical ventilation within 72 hours of SAH at a single academic center. Ventilator settings and blood gas data were collected twice daily for the first 7 days of ventilation along with ICU and hospital outcomes. Lung protective ventilation was defined as: tidal volume ≤8 mL/kg of predicted body weight (PBW), positive end-expiratory pressure (PEEP) ≥5 cm H2O, and peak or plateau Pressure ≤30 cm H2O. The development of ARDS was ascertained retrospectively by PaO2/FiO2 ≤300 with new bilateral lung opacities on chest x-ray within one day of hypoxemia.

Results: We identified 62 patients who underwent early mechanical ventilation following SAH. Pressure support and Continuous Positive Airway Pressure were common ventilator modes with a median tidal volume of 7.8 mL/kg [Interquartile range 6.8-8.8], median peak pressure of 14 cm H2O [IQR 12-17] and median PEEP of 5 cm H2O [IQR 5-6]. Adherence to tidal volumes ≤8 mL/kg was seen in 64% of all observations and peak pressures <30 cm H2O was 94% of all observations. All three lung protective criteria were seen in 58% of all observations. Thirty-one patients (50%) were determined to have ARDS. ARDS patients were more frequently ventilated with a peak pressure >30 cm H2O (11.3% of ARDS ventilation days vs. 0% of non-ARDS ventilation days; p<0.01). Initial tidal volume was not associated with subsequent development of ARDS in univariate (p=0.6) or multivariate analysis (p=0.49). Only the number of ARDS risk factors was independently associated with the development of ARDS (OR 4.3 per additional risk factor [95% CI 1.5-12.2]; p<0.01).
