How to Protect both Lung and Diaphragm in ARDS?

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Professional experience

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In acute respiratory distress syndrome (ARDS), mechanical ventilation can exert negative effects on both the lungs and the diaphragm. Lung injury occurs due to excessive stress and strain, whereas the diaphragm develops atrophy as a consequence of low respiratory effort and damage caused by excessive effort in breathing. Lung and diaphragm-protective ventilation is an approach that allows clinicians to promote physiological respiratory effort while maintaining minimal lung stress and strain. Noninvasive measurements, such as P0.1, airway occlusion pressure, and pressure-muscle index, may accurately detect low and excessive respiratory effort and high lung stress. Additional monitoring techniques include esophageal manometry, diaphragm ultrasound, electrical activity of the diaphragm, and electrical impedance tomography. Practical strategies to achieve lung and diaphragm protection goals at bedside include focusing on inspiratory and expiratory ventilator settings, monitoring inspiratory effort or respiratory drive, managing patient-ventilator dyssynchrony, and using appropriate sedation. Additionally, adjunctive strategies such as extracorporeal CO2 removal, partial neuromuscular blockade, and phrenic nerve stimulation may also be considered. Recent trials have demonstrated that a systemic approach to optimizing inspiratory support and sedation facilitates lung and diaphragm-protective ventilation. Achieving ventilation that is protective of the lungs and diaphragm in ARDS requires a comprehensive understanding of the physiology of breathing and mechanical ventilation, as well as the application of a series of interventions under close monitoring.