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Amelia Morgan
morgan2@otterbein.edu

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Acute Respiratory Distress Syndrome
Amelia Morgan, MSA, BSN, RN, CCRN
Otterbein University, Westerville, Ohio

Introduction
Acute respiratory distress syndrome (ARDS) was first recognized as a clinical entity in 1967 (Cutts et al., 2010). ARDS is “characterized by the presence of a diffuse alveolar injury and is a medical emergency” (Queen et al., 1967). The classic definition of ARDS has evolved over time and is now based on new diagnostic criteria that were established in 1994 (American College of Chest Physicians/Society of Critical Care Medicine, 1994).

Pathophysiology
Acute respiratory distress syndrome (ARDS) has been defined as “a potentially devastating form of hypoxic respiratory failure caused by acute inflammatory lung injury (Dalmedico, et al., 2017). The exact cause or trigger for ARDS is unknown. The long injury prediction score (LIPS) is a tool that may be used at hospital admission and has been validated to identify an accurate predictor of ARDS risk. Patients at highest risk for developing ARDS are patients with sepsis, trauma, pancreatitis, aspiration, high-risk trauma, and high-risk surgery, such as cardiac or esophageal” (Brower, 2016). The combination of factors that precipitate ARDS results in increased permeability of the capillary membrane and pulmonary edema (Nagelhurst & Elkins, 2018).

Risk Factors
Preceding events such as:
- Sepsis
- Aspiration
- Shock
- Pneumonia
- Aspiration
- Tachypnea
- High-risk trauma
- High-risk surgery, such as cardiac or esophageal

Significance of Pathophysiology
- Scientific evidence suggests that hypoxemia resulting from ARDS is best treated with a combination of lung protective ventilatory strategies, which include low tidal volumes, low positive end-expiratory pressures (PEEP), and a tidal volume-to-PEEP ratio of 0.5 to 0.6 (Brower, 2016). Accurate prediction of ARDS risk can be achieved by using the long injury prediction score (LIPS) (Brower, 2016). The LIPS score is a tool that may be used at hospital admission and has been validated to identify an accurate predictor of ARDS risk. Patients at highest risk for developing ARDS are patients with sepsis, trauma, pancreatitis, aspiration, high-risk trauma, and high-risk surgery, such as cardiac or esophageal surgery. This response also decreases the lungs ability to promote hypoxic pulmonary vasoconstriction (UPV). Under normal UPV, there is a mechanism that allows the pulmonary vasculature to shunt blood away from poorly ventilated areas of the lung to areas that are better ventilated, thus decreasing the ventilation-perfusion mismatch. Damage to the alveolar-capillary membrane also impairs oxygenation and decreases lung compliance making it difficult to ventilate the patient (Nagelhurst & Elkins, 2018).

Process of Pathophysiology
- Once the diagnosis is made from the clinical presentation and radiographic evidence, it is further classified according to the Berlin consensus.
- Mild (PaO₂/FiO₂ <300 mm Hg with PEEP or CPAP ≤ 5 cmH2O)
- Moderate (PaO₂/FiO₂ <300 mm Hg with PEEP or CPAP > 5 cmH2O)
- Severe (PaO₂/FiO₂ <100 mm Hg with PEEP or CPAP > 5 cmH2O) (Dalmedico, et al., 2017)

Reason for Topic
As a student nurse anesthetist, the importance of understanding the pathophysiology and implications of ARDS is to improve patient care and prevent adverse outcomes. Staying current on research and developments enables providers to adapt quickly to changing clinical scenarios. We are of the belief that understanding the impact of ARDS is crucial for patient care.

Implications for Nursing Care
- As Berry (2013) reports, preparing a patient for prone positioning is an arduous task that may require teamwork, nurses, and respiratory therapists, depending on their level of experience and comfort with positioning and specialized equipment to ensure safe positioning. The use of a RotaProne bed requires expert knowledge of both the pathophysiology of ARDS and familiarity of the bed’s care. Nurses may have to guard the skin, and cutaneous and subcutaneous tissues to maintain tolerance and minimize stress.
- ARDS survivors frequently have long-lasting psychiatric effects from their critical illness including post-traumatic stress disorder (PTSD), anxiety, and depression. Rates of psychiatric morbidity after surviving ARDS are as high as 52% (Bauermeister, et al., 2017). Delirium prevention and sleep promotion in the ICU are strategies that can affect the health of the bed. Nurses may have to guard the skin and protect the affected skin from trauma and maintain tolerance and minimize stress.

Conclusion
Ventilatory support continues to be the cornerstone of ARDS treatment (Dalmedico, et al., 2017). The use of low tidal volumes and low positive end-expiratory pressures in order to keep driving pressures low and prevent additive lung injury (Dalmedico, et al., 2017).

References
Bienvenu, J.T., Santoro, A., & Santoro, N. (2017). RotaProne® bed. Once head gear is applied and top rail is in place, patient is ready to be rotated to prone position.
Cutts, S., Talbot, R., Papazian, C., et al. (1994). Non-compliant or ‘iffy’ lungs associated with respiratory end-stage medical illness and do not warrant the medical emergency that ARDS is described as (Queen et al., 1967). The classic definition of ARDS has evolved over time and is now based on new diagnostic criteria that were established in 1994.