Learning Objective

- To learn Airway Pressure Release Ventilation (APRV) in Acute Respiratory Distress Syndrome (ARDS) with refractory hypoxemia
- To review the initial settings of APRV and how to make adjustments

Case Information

History
- 31 yo morbidly obese man presented to the ED with a 5 day history of fevers, body aches, and shortness of breath
- Initial evaluation demonstrated a patient in moderate respiratory distress
- Patient was placed on non-invasive positive pressure ventilation (NPPV)

Evaluation
- Patient desaturated to 70% while on NIPPV
- ABG showed a pH 7.40, PaCO₂ 48, PaO₂ 55, HCO₃⁻ 29
- CXR showed diffuse bilateral pulmonary infiltrates
- Patient was intubated and ventilated using assist control/pressure control (AC/PC) mode with fraction of inspired oxygen (FiO₂) of 100%
- Influenza A RT-PCR was positive

Hospital Course
- Patient remained hypoxic and hypercarbic despite increases in both pressure control (PC) and positive end-expiratory pressures (PEEP)
- After 8 days of persistent hypoxia on AC/PC mode, the patient was switched to APRV mode in an attempt to improve oxygenation
- On day two of APRV, FiO₂ was able to be weaned down to 50%, and PaO₂ increased to more than 90mmHg
- A Phigh of 39 cm H₂O was required to achieve this level of oxygenation given the patients low lung compliance secondary to morbid obesity
- After 5 days on APRV, patient was transitioned back to a traditional ventilation mode of AC/PC
- Patient was able to maintain his oxygenation and was successfully extubated 8 days later

Discussion

- Current guidelines advocate the use of low tidal volume ventilation to decrease the risk of ventilator-induced lung injury in ARDS
- In patients with ARDS, traditional modes of ventilation may not achieve adequate oxygenation due to impaired alveolar recruitment
- APRV is a mode of ventilation that applies continuous high airway pressure, followed by a time cycled release phase to a lower set pressure
- APRV allows for continuous recruitment by applying spontaneous breathing throughout the ventilatory cycle leading to ventilation-perfusion matching by preferentially aerating well-perfused dependent lung regions
- Improved alveolar recruitment and alveolar ventilation can lead to increased oxygenation in patients with severe ARDS
- Although low tidal volume strategies are proven to decrease mortality, 1/3 of patients will still die from ARDS. Such patients may benefit from APRV to maintain oxygenation while providing time for the underlying inflammatory process to resolve

References


When Traditional Modes of Ventilation Fail
Rosalio Rubio MD; Sharon DeCruz, MD
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