

Assessing P0.1 and Occlusion Pressures in Brain-Injured Patients on Pressure Support Ventilation: A Study Protocol

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Abstract : Monitoring inspiratory effort and dynamic lung stress in patients on pressure support ventilation in the ICU is important for protecting against self inflicted lung injury (P-SILI) and diaphragm dysfunction. Strategies to address the detrimental effects of respiratory drive and effort can lead to improved patient outcomes. Two non-invasive estimation methods, occlusion pressure (P_{oc}) and P0.1, have been proposed for achieving lung and diaphragm protective ventilation. However, their relationship and interpretation in neuro ICU patients is not well understood. P0.1 is the airway pressure measured during a 100-millisecond occlusion of the inspiratory port. It reflects the neural drive from the respiratory centers to the diaphragm and respiratory muscles, indicating the patient's respiratory drive during the initiation of each breath. Occlusion pressure, measured during a brief inspiratory pause against a closed airway, provides information about the inspiratory muscles' strength and the system's total resistance and compliance. Research Objective: Understanding the relationship between P_{oc} and P0.1 in brain-injured patients can provide insights into the interpretation of these values in pressure support ventilation. This knowledge can contribute to determining extubation readiness and optimizing ventilation strategies to improve patient outcomes. The central goal is to assess a study protocol for determining the relationship between P_{oc} and P0.1 in brain-injured patients on pressure support ventilation and their ability to predict successful extubation. Additionally, comparing these values between brain-damaged and non-brain-damaged patients may provide valuable insights. Key Areas of Inquiry: 1. How do P_{oc} and P0.1 values correlate within brain injury patients undergoing pressure support ventilation? 2. To what extent can P_{oc} and P0.1 values serve as predictive indicators for successful extubation in patients with brain injuries? 3. What differentiates the P_{oc} and P0.1 values between patients with brain injuries and those without? Methodology: P0.1 and occlusion pressures are standard measurements for pressure support ventilation patients, taken by attending doctors as per protocol. We utilize electronic patient records for existing data. Unpaired T-test will be conducted to compare P0.1 and P_{oc} values between both study groups. Associations between P0.1 and P_{oc} and other study variables, such as extubation, will be explored with simple regression and correlation analysis. Depending on how the data evolve, subgroup analysis will be performed for patients with and without extubation failure. Results: While it is anticipated that neuro patients may exhibit high respiratory drive, the linkage between such elevation, quantified by P0.1, and successful extubation remains unknown. The analysis will focus on determining the ability of these values to predict successful extubation and their potential impact on ventilation strategies. Conclusion: Further research is pending to fully understand the potential of these indices and their impact on mechanical ventilation in different patient populations and clinical scenarios. Understanding these relationships can aid in determining extubation readiness and tailoring ventilation strategies to improve patient outcomes in this specific patient population. Additionally, it is vital to account for the influence of sedatives, neurological scores, and BMI on respiratory drive and occlusion pressures to ensure a comprehensive analysis.

Keywords : brain damage, diaphragm dysfunction, occlusion pressure, p0.1, respiratory drive

Conference Title : ICSIC 2023 : International Conference on Surgical Intensive Care

Conference Location : Amsterdam, Netherlands

Conference Dates : December 04-05, 2023