Correlation between The SpO2/FiO2 Ratio and Pao2/FiO2 Ratio in Patients with Acute Respiratory Distress Syndrome

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Background: ARDS is characterized by severe hypoxemia. This syndrome is associated with high mortality and morbidity. Treatment of ARDS requires invasive arterial sampling for PaO2/FiO2 (PF ratio). Previous research found the correlation between PaO2/FiO2 (PF ratio) and SpO2/FiO2 (SF ratio) in patients with acute lung injury and ARDS. The pulse oximetric saturation (SF ratio) may be a reliable non-invasive alternative to the PF ratio in ARDS.

Objective: To study the correlation between SpO2/FiO2 and PaO2/FiO2 in patients with ARDS.

Methods: In this prospective observational study, we enrolled 24 patients with ARDS who were admitted in the intensive care unit (ICU) at Phramongkutklao Hospital during January-December 2017. Arterial blood gas results were measured through arterial blood sampling. Whereas, SpO2 results were measured with pulse oximetry and ventilator settings were recorded to determine the relationship between SF and PF ratio.

Results: In the derivation data set (735 measurements), the relationship between SF and PF described by the following equation: PF ratio = 18.28 + 0.81SF ratio (p<0.001;r=0.781). Thus, PF ratio of 99.28, 180.28 and 261.28 could be substituted by SF ratio of 100, 200, and 300 in ARDS patients, respectively. The subgroup of ARDS phase showed similar linear relationship of SF and PF ratio.

Conclusion: SF ratio is a reliable noninvasive surrogate for PF ratio to identify ARDS patients, with the advantage of replacing invasive arterial blood sampling by non-invasive pulse oximetry.

Keywords: ADRS, PaO2/FiO2, Pulse oximetry