

Abstract

Introduction: The early identification and scrupulous monitoring of tissue dysoxia can improve the management of critically-ill patients. In this light, the final product of aerobic and anaerobic metabolism (that is, carbon dioxide) can provide useful information on adequacy of tissue perfusion and metabolism (9,10). ***The aim of our study*** was to evaluate whether the venous-arterial PCO₂ gradient provides useful information on tissue dysfunction in patients admitted to the ICU

Methods: We prospectively studied 50 patients admitted to ICU in 2012/2013 with length of stay (LOS) >24 hours. A sample of arterial and venous blood was taken for gas analysis at admission. Venous-arterial PCO₂ gradient ($\Delta p\text{CO}_2$), organ dysfunction in the first 24 hours and ICU mortality were collected. Organ dysfunction was defined as a SOFA score ≥ 2 for each organ. The patients, whether ventilated or not, were subdivided and compared on the basis of $\Delta p\text{CO}_2$ value: $\Delta p\text{CO}_2 \geq 6$ mmHg (*Higher* group) and $\Delta p\text{CO}_2 < 6$ mmHg (*Normal* group).

Results: Twenty-nine patients (58%) showed a $\Delta p\text{CO}_2 \geq 6$ mmHg (*Higher* group) and twenty-one patients (42%) showed a $\Delta p\text{CO}_2 \leq 6$ mmHg (*Normal* group). The *Higher* group showed a larger rate (34%) of **cardiovascular** dysfunction than the *Normal* group (8%) ($P < 0.05$). **Respiratory** dysfunction was observed in 54% of the patients of the *High* group and only in 32% of the *Normal* group. Similarly, **renal** dysfunction was also slightly larger in the *Higher* group (26%) than in the *Normal* group (20%) ($P > 0.05$). As expected, patients of *Higher* group showed more **complications** (52%) than *Normal* group (32%) ($P > 0.05$) and ICU **mortality** (40%) three times larger than *Normal* group (12%) ($P < 0.05$).

Conclusions & Recommendations: Despite its limitations, The above data support the hypothesis that $\Delta p\text{CO}_2$ can provide useful information on the tissue perfusion and metabolism in ICU patients and can be used as a reliable biomarker for early prediction of organ dysfunction and outcome in critically-ill patients. But, further studies on a larger number of patients are needed to confirm its reliability.

Limitations : Our study was done on a small sample size and based on a pre-defined set of study parameters, which might not have reflected the true nature of general changes observed in sepsis.

Key words: Dysoxia - Shock - Delta PCO₂ - Haemodynamics - Scoring systems - Organ dysfunction - Clinical outcome.