Prognostic Value of Venous to arterial Carbon-dioxide difference during early resuscitation in critically ill patients with septic shock.

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Abstract

Objective: In this study we investigated the prognostic value of venous-to-arterial carbon dioxide difference during early resuscitation of patients with septic shock and compared it with that of lactate clearance and APACHE II score.

Methods: This prospective study enrolled 40 patients admitted to Critical Care department, Alexandria University and fulfilled the diagnostic criteria of septic shock. Patients were followed for six hours from admission. These patients were subjected to complete history taking, detailed physical examination, APACHE-II Score of patients was calculated on admission, routine laboratory investigations were carried out on every patient, an arterial blood gas (ABG) sample was obtained and another central venous sample (VBG) was obtained on admission, and after 6 hours. The hemodynamic and respiratory variables were registered at each measurement. Venous to arterial CO_2 difference (Pv-aCO_2) or PCO_2 gap was calculated as the difference between the central venous CO_2 partial pressure and the arterial CO_2 partial pressure. A Pv-aCO_2 value ≥ 6 mmHg was considered to be high. The patients were classified into survivors group or group I and non-survivors group or group II. Pv-aCO_2 difference in the two groups was evaluated. Lactate level was measured on admission and after 6 hours and lactate clearance was calculated. Patients were managed according to the latest surviving sepsis campaign guidelines and patients were followed till death or discharge from ICU and the following parameters were recorded: need for mechanical ventilation and its duration, days of vasopressor need, application of renal replacement therapy, and days of ICU stay.

Results on admission (T0), non-survivors group or group II showed high PCO_2 gap (8.37 $\pm$ 1.36mmHg) than survivors group or group I (7.55 $\pm$ 0.95 mmHg) with significant statistical difference (P=0.030). There was no significant statistical difference between two groups according to serum lactate where both groups showed high lactate values at T0. While after 6 hours(T6), group II showed higher PCO_2 gap (9.48 $\pm$ 1.47mmHg) with significant statistical difference (P

<0.001) and higher mean lactate values (62.71 $\pm$ 23.66 mg/dl) with significant statistical difference (P<0.001) than group I where PCO_2 gap and mean lactate values became much lower (5.91 $\pm$ 1.12 mmHg) and (33.61 $\pm$ 5.80 mg mg/dl) respectively. Group I showed higher lactate clearance (25.42 $\pm$ 6.79 %) with significant statistical difference (P <0.001) than group II (-69.40 – -15.46 %). The cutoff values that predicted mortality in septic shock patients were PvaCO2 T6 >7.8 or APACHE II score on admission >25 while that of lactate clearance that predicts mortality was 11% with 100% sensitivity, specificity, PPP and NPP.

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