Differences Between Fluid Resuscitation Vs Norepinephrine Effect on Lactate and Blood Gas Parameters: An Experimental Study in Porcine Septic Shock Model

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Abstract

Introduction: Septic shock management in the form of fluid resuscitation and norepinephrine has distinct mechanism of action that may lead into differences in metabolic outcomes. This study aimed to compare the results of fluid resuscitation management with norepinephrine administration on lactate, hemodynamic, and blood gas parameters.

Methods: This is an experimental laboratory study using septic shock animal models (porcine) aged 16-20 weeks, 40-60kg, then divided into Fluid Resuscitation (FR) and Nor-epinephrine (NE) groups. A total of 4 FR groups and 4 NE groups were included in the study. After septic shock induction, hemodynamics (SBP, DBP, MAP, HR), and metabolic and blood gas parameters (pH, PaO_2, $PaCO_2$, HCO_3, TCO_2, lactate, SaO_2, and Anion Gap) were taken. Data are presented as mean ± standard deviation, and statistical analysis was performed using the unpaired T test or Mann-Whitney U test, according to the data distribution of each parameter.

Results: Lactate parameter analysis and blood gas analysis showed that there were mostly no significant differences between the Fluid Resuscitation (FR) and Nor-epinephrine (NE) groups, except for PaO_2 (P=0.001) and SaO_2 (P=0.014). The average lactate level in the FR group was 3.33±1.88 mmol/L, while in the NE group it was 4.01±2.61 mmol/L (p = 0.773).

Conclusion: There were no statistically significant differences between the Fluid Resuscitation (FR) and Nor-epinephrine (NE) groups in most hemodynamic, metabolic, and blood gas parameters. However, the NE group showed a significant increase in PaO_2 and oxygen saturation (SaO_2) values compared to the FR group, indicating that nor-epinephrine administration may have a positive effect on tissue oxygenation

Keywords

Septic shock, fluid resuscitation, norepinephrine.