Relationship of LOI and brain dysfunction after resuscitation in a porcine model of cardiac arrest

X. Zhai1, L. Jiang1, Z. Yang1,2, C. Wen1, H. Zheng1, T. Yu1,2, M. Peberdy2,3 and W. Tang1,2,3,4
1Sun Yat-sen Memorial Hospital, Sun Yat-sen University, Guangzhou, China 2Weil Institute of Emergency and Critical Care Research at VCU, VA 3Department of Internal Medicine and Emergency Medicine, VCU, VA 4Department of Emergency Medicine, VCU, VA

Background

Lactate oxygen index (LOI) higher than 0.08 has been proposed as an early indicator of brain ischemia injuries. In the present study, we investigated the relationship between LOI and brain dysfunction after cardiopulmonary resuscitation (CPR) in a porcine model of cardiac arrest (CA) with different downtimes. We hypothesized that LOI closely correlates with brain dysfunction after resuscitation.

Methods

Ventricular fibrillation (VF) was electrically induced in 16 male domestic pigs weighing 40±2kg. They were randomized into untreated VF 5 min group (V5, n=8) or 10 min group (V10, n=8). All animals were successfully resuscitated. Blood gas samples were obtained from internal jugular venous and descending aorta at baseline (BL) and 120 min post resuscitation (PR). Neurological dysfunction score (NDS) was evaluated daily for a total of 96 hours. LOI was calculated based on the arterial (CaO2) and jugular venous oxygen (CJ02) content:

\[ \text{CaO}_2 = (1.34 \times \text{Hb} \times \text{SaO}_2) + (0.003 \times \text{paO}_2) \]
\[ \text{CJ}_2 = (1.34 \times \text{Hb} \times \text{SjO}_2) + (0.003 \times \text{pjO}_2) \]

LOI = -(arterial lactate-jugular vein lactate)/(CaO2-CJ02).

Results

LOI, lactate oxygen index; V5, untreated ventricular fibrillation for 5 min; V10, untreated ventricular fibrillation for 10 min; PR, post resuscitation. *P<0.05 vs baseline; †P<0.05 vs V5.

NDS, Neurological Dysfunction Score; V5, untreated ventricular fibrillation for 5 min; V10, untreated ventricular fibrillation for 10 min; PR, post resuscitation. *P<0.05 vs baseline; †P<0.05 vs V5.

Conclusions

LOI positively correlates with post-resuscitation neurological dysfunction and might serve as a promising indicator to predict cerebral outcome after CPR.

References