Changes in respiratory system static compliance after resuscitation in a Porcine Model of Prolonged Cardiac Arrest

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Background

Acute lung injury is common after resuscitation due to ischemia reperfusion injury and complications of cardiopulmonary resuscitation (CPR). The static compliance of the respiratory system (Csrs) is a reliable indicator of lung injury, together with chest-wall compliance (Cscw) and lung compliance (Csl). In the present study, we investigated the changes in Csrs, Cscw and Csl after resuscitation in a porcine model of prolonged cardiac arrest (CA). We hypothesized both Csrs and Csl will decrease after prolonged CA and CPR without significant changes in Cscw.

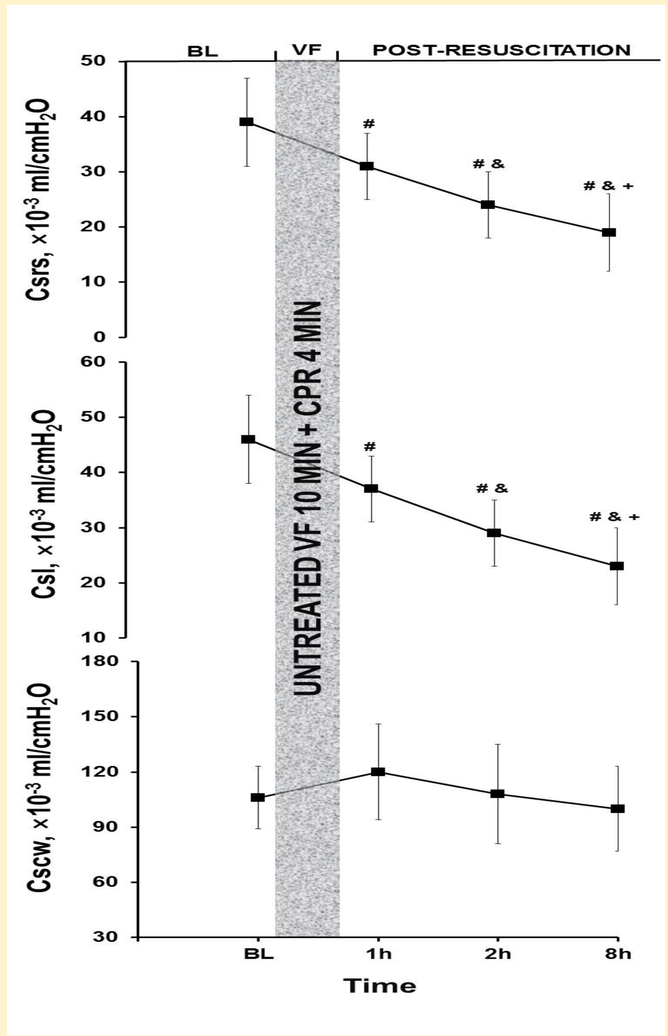
Methods

Animal Model

Ventricular fibrillation was electrically induced and left untreated for 10 minutes in six male domestic pigs weighing 39±3 kg. Defibrillation was then attempted by a single 150 J shock after 4 minutes of CPR. All animals were resuscitated successfully. Succinylcholine chloride (1.0mg/kg) was given intravenously to relax the respiratory muscles and static pressure-volume (P-V) curves were obtained by constant low-flow method at baseline, 1, 2 and 8hours after resuscitation. Airway opening pressure, esophageal pressure, transpulmonary pressure and tidal volume were assessed. Csrs, Cscw and Csl were calculated as the slope rates of the liner portion of the corresponding P-V curves.

Results

Figure 1. Changes in respiratory system static compliance, chest wall compliance, and lung compliance.



Csrs, respiratory system static compliance ; Csl, lung static compliance; Cscw, chest wall static compliance ; BL, baseline; VF, ventricular fibrillation; CPR, cardiopulmonary resuscitation.

#*P*<0.05 vs baseline; *P*<0.05 vs 1 h post-resuscitation; +*P*<0.05 vs 2 h post-resuscitation.

Decreases in both Csrs and Csl were observed after resuscitation when compared with baseline (Figure 1). However, Cscw increased slightly at 1 hour after resuscitation and returned to baseline 2 hours post-resuscitation.

Conclusions

Both Csrs and Csl were reduced following resuscitation without changes of Cscw in a porcine model of prolonged CA and CPR.

References

1.Stahl CA, Moller K et al. Crit Care Med. 2006; 34; 8; 2090-8
2.Wang S, Wu JY, Li CS et al. Crit Care Med. 2013; 41; 1; 102-10

Disclosure

None