

Sample size and power estimates

Our primary outcome measure was CPR time to achieve ROSC. Our previous studies showed a mean \pm standard deviation ROSC of 180 ± 25 secs during CPR using 3:1 C:V. We hypothesized that the use of SI during CPR with CC+SI 90 would reduce time to achieve ROSC. A sample size of 16 piglets (8 per group) was sufficient to detect a clinically important (33%) reduction in time to achieve ROSC (i.e. 180 sec vs. 120 sec), with 80% power and a 2-tailed alpha error of 0.05.

Animal Preparation

Piglets were instrumented as previously described with modifications[9,13]. In brief, following the induction of anaesthesia using isoflurane, piglets were intubated via a tracheostomy, and pressure-controlled ventilation (Sechrist infant ventilator, model IV-100; Sechrist Industries, Anaheim, CA) was commenced at a respiratory rate of 16-20 breaths/min and pressure of 20/5 cmH₂O. Oxygen saturation was kept within 90-100% and glucose level and hydration were maintained with an intravenous infusion of 5% dextrose at 10 mL/kg/hr. During the experiment, anaesthesia was maintained with intravenous propofol 5-10 mg/kg/hr and morphine 0.1 mg/kg/hr. Additional doses of propofol (1-2 mg/kg) and morphine (0.05-0.1 mg/kg) were also given as needed. The piglet's body temperature was kept normothermic (38.5-39.5°C) using an overhead warmer and a heating pad[14].

Respiratory parameters

A respiratory function monitor (NM3, Respironics, Philips, Andover, MA) was used to continuously measure tidal volume (V_T), airway pressures, gas flow, and exhaled CO₂ (ECO₂). The combined gas flow and ECO₂ sensor was placed between the endotracheal tube and the

ventilation device. V_T was calculated by integrating the flow signal. ECO_2 was measured using non-dispersive infrared absorption technique[15]. According to the manufacturer, the accuracy for gas flow is ± 0.125 L/min, $ECO_2 \pm 2$ mmHg.

Hemodynamic parameters

A 5-French Argyle® (Klein-Baker Medical Inc. San Antonio, TX) double-lumen catheter was inserted via the right external jugular vein for administration of fluids and medications. A 5-French Argyle® single-lumen catheter was inserted below the right renal artery via the femoral artery for continuous arterial blood pressure monitoring in addition to arterial blood gas measurements. A Millar® catheter (MPVS Ultra®, ADInstruments, Houston, TX) was inserted into the left ventricle via the left common carotid artery for continuous measurement of left ventricular pressure, including composite and segmental volumes, which served as a surrogate for cardiac output. Ejection fraction, maximal slope of systolic pressure increment (dP/dT_{max}), and time constant of left ventricle decay (Tau) were measured by the Millar® catheter and calculated with LabChart® programming software (ADInstruments, Houston, TX). Because of the size difference between the Millar® catheter and LV longitudinal axis which posed a limitation for the accuracy of in vivo volume measurement, an alpha factor = 0.46, based on comparison between Millar's recording and direct echocardiographic measurements in 3 piglets, was used to correct the conductance volume. The right common carotid artery was also exposed and encircled with a real-time ultrasonic flow probe (2mm; Transonic Systems Inc., Ithica, NY) to measure blood flow.

Piglets were put to supine position and allowed to recover from surgical instrumentation until baseline hemodynamic measures were stable. Ventilator rate was adjusted to keep the partial

arterial CO₂ between 35-45 mmHg as determined by periodic arterial blood gas analysis. Mean arterial pressure, heart rate, and percutaneous oxygen saturation were continuously measured and recorded throughout the experiment with a Hewlett Packard 78833B monitor (Hewlett Packard Co., Palo Alto, CA).

Cerebral oxygenation

Cerebral oxygenation (crSO₂) was measured using the InvoSTM Cerebral/Somatic Oximeter Monitor (InvoS 5100, Somanetics Corp., Troy, MI). The sensors were placed on the right forehead of the piglet and secured with wrap and tape. The InvoSTM Cerebral/Somatic Oximeter Monitor calculates crSO₂, which is expressed as the percentage of oxygenated haemoglobin (oxygenated haemoglobin/ total haemoglobin). Values of regional oxygen saturation are stored every sec with a sample rate of 0.13 Hz[16].