Early Intra-Nasal Cooling During CPR Using Either Oxygen Or Air As A Propellant of the Evaporative Cooler

Jun Hwi Cho, MD[1]; Giuseppe Ristagno, MD[1]; Tao Yu, MD[1]; Yongqin Li, PhD[1]; Shijie Sun, MD[1,2]; Carlos Castillo, MSEE[1]; Max Harry Weil, MD,PhD[1,2]; Wanchun Tang, MD[1,2]

The Weil Institute of Critical Care Medicine, Rancho Mirage, CA, USA
The Keck School of Medicine of the University of Southern California, Los Angeles, CA, USA
Northwestern University, Feinberg School of Medicine, Chicago, IL, USA

Introduction: We have previously reported that early intra-nasal cooling during CPR improved the success of resuscitation after prolonged ventricular fibrillation (VF). In the present study, we investigated the effects either compressed air or oxygen as vehicle of cooling on the outcomes of CPR in a porcine model of prolonged VF.

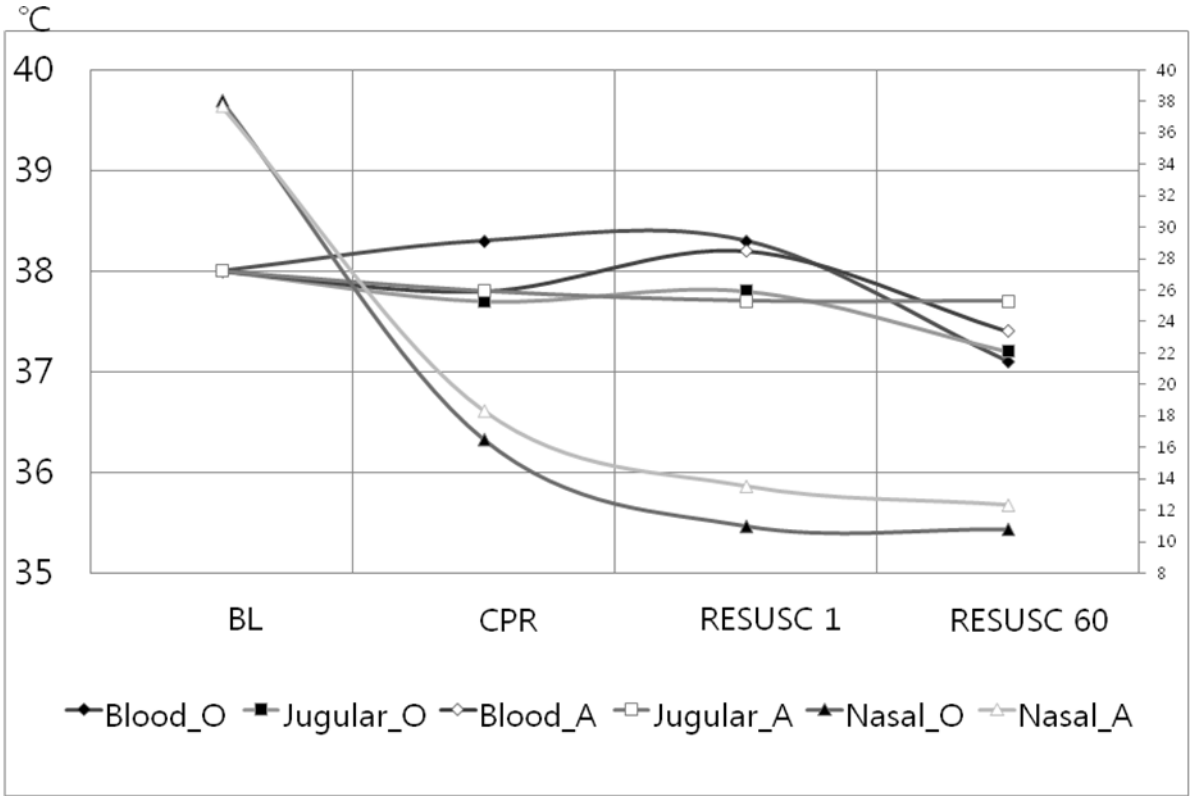
Hypothesis: Air may be utilized in place of oxygen to propel the perfluorcarbon coolant for head cooling.

Methods: VF was electrically induced and untreated for 15 minutes in 6 domestic male pigs weighing 40±3 kg. Animals were then randomized to nasal cooling using either air or oxygen as the propellant. CPR was performed for 5 minutes prior to defibrillation and failing to achieve return of spontaneous circulation (ROSC) continued for a maximum of 15 minutes. Mean aortic and right atrial pressures were continuously measured and coronary perfusion pressure (CPP) were calculated. Nasal, pulmonary artery blood, and jugular vein blood temperatures were recorded and blood gases were analyzed during CPR.

Results: Two animals were resuscitated after intra nasal cooling was oxygen as the propellant and three animals with compressed air (p=0.273). Nasal, core and jugular temperatures were no different between the groups (Figure). No differences in CPP, rate of ROSC, or 24 hour survival were detected (Table). As anticipated, increases in PaO_2 were observed with oxygen during CPR. Post resuscitation myocardial function did not differ between the oxygen and air groups.

Conclusion: Compressed air serves as an alternate propellant for head cooling during CPR and differences are not statistically significant although oxygen may have potential advantages

Figure



Table

	Oxygen (n=3)	Compressed Air (n=3)	p-value
ROSC	2/3	3/3	0.273
Duration of Survival, Hour	16±14	8±6	0.433
PaO_2 at 5 minute, mmHg	151±61	80±19	0.404
EF, %			
Baseline	69±2	69±1	0.667
PR 4 Hour	57±1	49±7	0.237

ROSC= return spontaneous circulation; EF= ejection fraction; PR= post resuscitation