Epinephrine reduces carotid blood flow during cardiopulmonary resuscitation in a porcine model of cardiac arrest

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Presenter Disclosure Information

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None

CPP & success of CPR
INTRODUCTION (1)

Epinephrine, which has been routinely administered during CPR, increases coronary perfusion pressures and thereby facilitates restoration of spontaneous circulation.

Lewis CM et al. JAMA 1969

Prospective, nonrandomized, observational propensity analysis of data from 417,188 OHCAs occurring in 2005-2008 in Japan

Hagihara et al. JAMA 2012

Rationale for Use of Epinephrine

\[ \alpha \text{ effects} \]

\[ \uparrow \text{systemic vascular resistance} \]

\[ \uparrow \text{myocardial & cerebral blood flow} \]

\[ \uparrow \text{success of resuscitation} \]
INTRODUCTION (2)

Epinephrine enhanced myocardial perfusion pressure and myocardial blood flow despite significantly decreasing cardiac output.

Chase PB et al. Crit Care Med 1993

CO during Chest Compression, L/min

<table>
<thead>
<tr>
<th></th>
<th>Before epinephrine</th>
<th>After epinephrine</th>
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<tbody>
<tr>
<td>2 mins CPP</td>
<td>14±4 mmHg</td>
<td>29±6 mmHg</td>
</tr>
<tr>
<td>4 mins CPP</td>
<td></td>
<td>14±4 mmHg</td>
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* p < 0.01


INTRODUCTION (3)

Microcirculatory blood flow in sublingual tissues is significantly reduced after administration of epinephrine during CPR.

AIM
We investigated the effects of epinephrine on carotid blood flow (CBF) during CPR in a porcine model of post shock pulseless electrical activity (PEA) cardiac arrest.

HYPOTHESIS
Administration of epinephrine during chest compressions will increase coronary perfusion pressure but will decrease CBF.
METHODS

- 9 male pigs 22-24 kg
- Aortic and right atrial pressures were invasively monitored and CPP calculated
- VF was electrically induced and PEA produced by delivering electrical countershock(s)
- Epi (20 ug/kg) was administered into the right atrium after 2 min of CPR and repeated every 3 min thereafter.

**Mechanical CPR**

**CBF measure**
*(left common carotid artery)*

**Transonic Flow Probe**
RESULTS

CPP significantly increased from $14 \pm 6$ mmHg before epi to a peak of $32 \pm 13$ mmHg ($p < 0.01$) within 1 min.

Concurrently, CBF decreased from $46 \pm 19$ mL/min before epi to the lowest value of $22 \pm 18$ mL/min ($p < 0.01$) within 30 sec.

These effects persisted beyond 3 min after epi.

Continuous CBF measurement, mL/min

Baseline

CBF measurement after epi, mL/min

CBF at 10 sec (upper) and 180 sec after epi (below)
CONCLUSIONS

In this model, administration of epi significantly increased CPP during CPR. Increases in CPP, however, were not accompanied by increases in CBF, which was markedly reduced following epi.

THANK YOU