Femoral vessel occlusion enhances cardiac and cerebral perfusion in porcine model of cardiac arrest.

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Intro:
Fatality from cardiac arrest exceeds 85-90% despite best practices with cardiopulmonary resuscitation (CPR). An adjunctive technology is needed to improve patient survival and meaningful neurologic recovery. This study evaluated whether external femoral vessel occlusion (FVO) in a porcine model can increase mean arterial pressure (MAP) and perfusion of the vital organs during CPR.

Methods:
Thirteen adult pigs were anesthetized, ventilated, and had central lines placed for monitoring hemodynamic values. Cardiac arrest was electrically induced, and CPR was performed by the LifeStat device for thirty minutes on animals randomized to a no FVO/control (n=7) or FVO during CPR (n=6) condition. Cardiac and cerebral perfusion was quantified by fluorescent microspheres injected into the circulation.

Results:
During native heart function, FVO demonstrated a 12.5% increase in carotid MAP when compared to no FVO (73.8 vs. 65.4 mmHg, $p < 0.001$). Animals who received FVO during CPR had a significantly higher MAP compared to CPR alone animals (48.98±8.7 vs. 32.3±3.3 mmHg, $p<0.0001$). CPR with FVO resulted in a significant increase in cardiac perfusion and in cerebral perfusion as measured by mean fluorescence intensity (MFI) (cardiac: 181 vs 80 MFI, $p = 0.0137$; cerebral: 119 vs. 27 MFI, $p< 0.0001$).

Conclusion:
CPR with FVO significantly increased MAP, cardiac perfusion, and cerebral perfusion over CPR alone. Increases in MAP and perfusion could translate to a benefit in survivability and neurologic recovery. FVO represents an underutilized non-invasive adjunctive strategy and a therapeutic opportunity to enhance vital organ perfusion during cardiac arrest to reduce morbidity and mortality.