Coronary perfusion pressure-guided identification of the optimum chest compression point in a rat model of cardiopulmonary resuscitation

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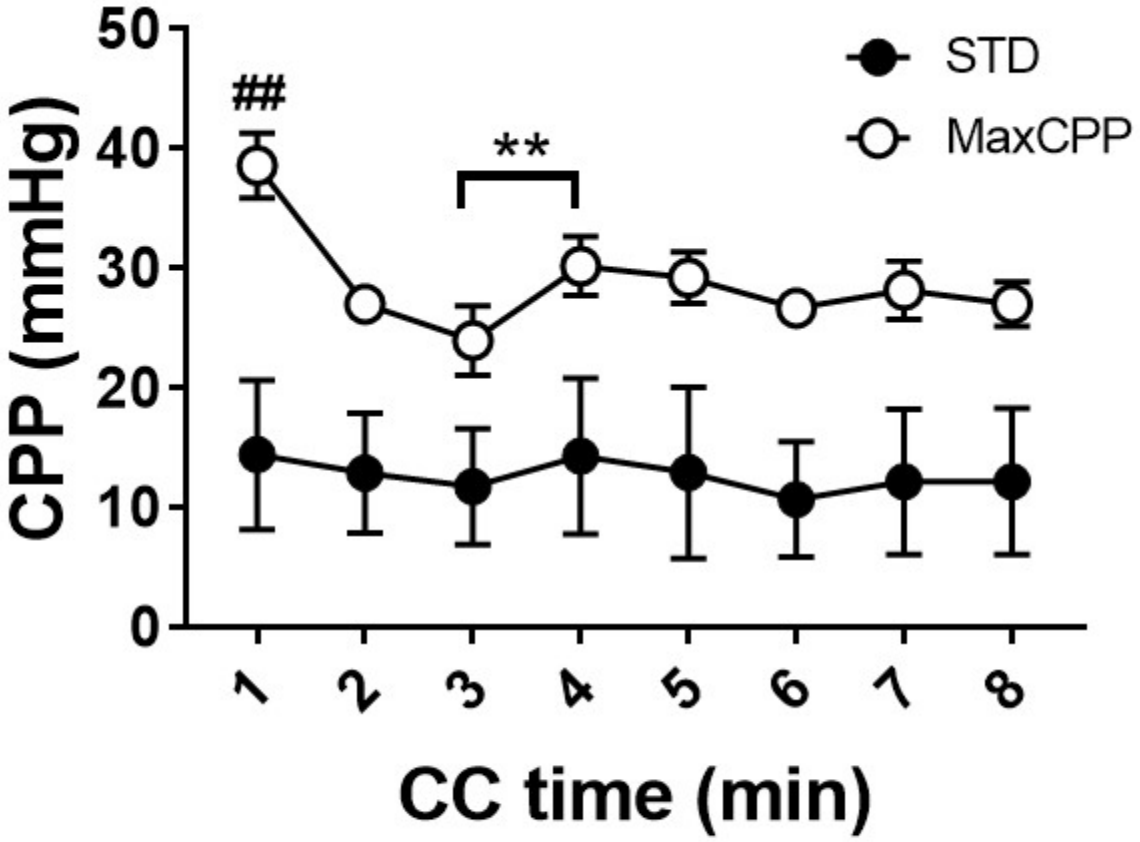
Argomento: Trauma e arresto cardiaco

The priority of cardiopulmonary resuscitation (CPR) is to re-establish systemic blood flow by chest compression (CC) and thereby achieving threshold levels of coronary perfusion pressure (CPP). Current guidelines recommend to compress above the lower sternal half as optimum CC point. However, this CC point might change among patients. This study investigated the hemodynamics generated by CC performed on different chest points in a rat model of CPR. It was hypothesized that a CC point hemodynamically-identified (MaxCPP) would represent a better CPR approach compared to the standard (STD) lower sternal half.

Ten male rats were anesthetized, intubated and mechanically ventilated. Hemodynamic was continuously monitored. Ventricular fibrillation was electrically induced and untreated for 8 min. Mechanical CC, ventilation with oxygen, and epinephrine, was then performed for 8 min. Animals were divided to receive STD CC (n=5) or MaxCPP CC (n=5). After resuscitation, computed tomography (CT) analysis was performed.

STD CC produced a CPP that was constantly below the threshold for successful resuscitation and trended to decrease over time. When the optimum CC point was identified hemodynamically, the CPP generated was constantly above 20 mmHg. Indeed, CPP was significantly higher in the MaxCPP group compared to the STD one for the whole 8 min of CPR. Moreover, administration of epi rapidly further improved CPP in the group with an optimized CC point, while less drug effect was observed in the STD one. CT scan showed that the lower sternal half point did not correspond to a chest area above the LV maximum diameter, known to account for a maximum stroke volume generation during CC.

Standard CC point is not able to maximize hemodynamics during CPR, making ineffective CC efforts and vasopressor administration. However, it is possible to improve the quality of CPR identifying the optimum CC point as a reflection of CPP generated.



Epinephrine was administered at PR4
p<0.01 vs. STD; **p<0.01 between pre and post epinephrine administration in MaxCPP group