Improved hemodynamics with a novel chest compression device during treatment of in-hospital cardiac arrest.

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Introduction
Previous research has shown that increased coronary perfusion pressure (CPP) during cardiopulmonary resuscitation (CPR) correlates with increased coronary blood flow and improved survival from sudden cardiac arrest. The purpose of this clinical study was to determine if a novel chest compression device (AutoPulse, Revivant Corp) improves hemodynamics during CPR when compared with manual chest compressions. The AutoPulse is an automated, electromechanical chest compression device that utilizes a load-distributing band to compress the anterior chest. AutoPulse automatically adjusts to the size and shape of each patient.

Methods
With institutional review board approval, 16 terminally ill subjects (68±6yrs) who suffered in-hospital sudden cardiac arrest were studied. All subjects were endotracheally intubated. Following a minimum of 10 minutes of failed advanced life support, fluid-filled catheters were advanced into the thoracic aorta and the right atrium, with placement confirmed by pressure waveforms and chest radiograph. Subjects then received alternating periods of manual and AutoPulse chest compressions for 90 seconds each. Chest compressions were administered at 100/min for manual, and 60/min for AutoPulse. Subjects received bag-valve ventilation (12/min) between compressions. Epinephrine (mg IV bolus) was given at the request of the attending physician at 3-5 minute intervals. CPP was measured as the difference between the aortic and right atrial pressures during chest decompression.

Results
Peak aortic pressures were higher with AutoPulse chest compressions when compared to manual chest compressions (150±8 vs 122±11mmHg, p<0.05, mean±SEM), as was CPP (20±3 vs 15±3 mmHg, p<0.02). The AutoPulse improved peak aortic pressure and CPP despite the use of high quality manual compressions (47±3 kg).

Conclusion
Hemodynamics with the AutoPulse were improved over those of standard manual CPR in this terminally ill patient population. CPP was raised above the level generally associated with improved survival, and strongly suggests that survival may be improved with the use of AutoPulse in viable patients.
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