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The optimal phasic relationship between synchronized shock and mechanical chest compressions.

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Source

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Abstract

OBJECTIVE:

Pauses for shock delivery in chest compressions are detrimental to the success of resuscitation and may be eliminated with the use of mechanical chest compressors. However, the optimal phasic relationship between mechanical chest compression and defibrillation is still unknown. We therefore undertook a study to assess the effects of timing of defibrillation in the mechanical chest compression cycle on the defibrillation threshold (DFT) using a porcine model of cardiac arrest.

METHODS:

Ventricular fibrillation was electrically induced and untreated for 10s in 8 domestic pigs weighing between 26 and 30 kg. Mechanical chest compression was then continuously performed for 25s, followed by a biphasic electrical shock which was delivered to the animal at 6 randomized coupling phases, including a control phase, with a pre-determined energy setting. The control phase was chosen at a constant 2s following discontinued chest compression. A novel grouped up-and-down DFT testing protocol was used to compare the success rate at different coupling phases. After a recovery interval of 4 min, the testing sequence was repeated, resulting in a total of 60 test shocks delivered to each animal.

RESULTS:

No difference between the delivered shock energy, voltage and current were observed among the 6 study phases. The defibrillation success rate, however, was significantly higher when shocks were delivered in the upstroke phase of mechanical chest compression.

CONCLUSION:

Defibrillation efficacy is maximal when electrical shock is delivered in the upstroke phase of mechanical chest compression.