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Comparison of the efficacy and safety of monophasic and biphasic defibrillation in toy breed dogs

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Defibrillation is the method of restoring a sinus rhythm from cardiac dysarrhythmias by delivering an electric shock to the patient through the chest wall. Although the defibrillation is a part of cardiopulmonary resuscitation, any clinical studies into the efficacy and safe use of defibrillation in small animals, especially in small and toy dog breeds, has not been conducted to date. In this study, we performed to evaluate the efficacy and safety of biphasic (BP) defibrillation *versus* monophasic (MP) defibrillation in toy breed dog (less 5 kg of body weight). The study included five dogs (pilot study) and ten dogs (comparison study of biphasic vs monophasic defibrillation). The efficacy of defibrillation were compared by estimating E80 (80% probability of successful defibrillation) after biphasic (BP) and monophasic (MP) defibrillations. The E80 for BP defibrillation was 7.24 ± 1.333J (2.24 ± 0.413 J/kg) and 10.24 ± 1.343J (3.18 ± 0.124 J/kg) for MP defibrillation. BP waveform required 30% less shock energy for a successful defibrillation. In order to compare the safety of defibrillation, we evaluated changes in cardiac biomarkers, electrocardiogram, echocardiographical left ventricular index and aortic pressure during and after BP and MP defibrillation. All dogs treated by either BP or MP defibrillation survived. Pulseless electrical activity occurred in 2 of 5 dogs during MP defibrillation. The levels of cardiac biomarkers were elevated and sustained for longer periods in the MP defibrillation group. Electrographical changes (e.g. QT prolongation, the time to return to an isoelectric ST segment after shocks) were more severe and longer in the MP defibrillationgroup. In addition, overall left ventricular cardiac performance was severely depressed in the MP group compared to the BP group. Our findings suggest that BP defibrillation is more effective and safer than MP defibrillation and determined the acceptable shock energy to be2-4 J/kg for toy breed dogs.

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