DEFIBRILLATION LEAD WITH PRE-FORMED SPIRAL SHAPE ENHANCES POSITIONAL STABILITY.
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For an implantable atrial defibrillator to function reliably with a coronary sinus/great cardiac vein (CS/GCV) to right atrium (RA) shock vector, CS/GCV lead dislodgment must be avoided. Reports of ventricular defibrillation (VDF) in man using a CS/GCV led have shown a low but significant dislodgment rate. In our experience in sheep, leads similar to those used for VDF have resulted in >25% dislodgment rate. In 14 adult sheep (60±4 kg), a CS/GCV to RA atrial defibrillation lead system was implanted. A 7 Fr. silicone lead with a 6 cm shocking coil designed to assume a preformed spiral shape following stylet removal was positioned in the CS/GCV. An atrial defibrillation threshold (ADFT) was obtained at implant (n=12) and follow-up 4-8 weeks later (n=10). None of the 14 spiral leads dislodged. No gross evidence of injury to the coronary sinus was found at euthanasia; the coronary sinus was patent. Mean ADFT was 0.8 ± 0.5 J at implant and 0.9 ± 0.5 J at follow-up (p>0.05). Conclusions: (1) In this sheep model, leads with a distal pre-formed spiral shape had improved lead stability and therefore did not dislodge. (2) Mean ADFT in this sheep model is less than 1 J over 2 months of lead implant.

• V BIPHASIC DEFIBRILLATION

META-ANALYTICAL VALIDATION OF THE BURPING HYPOTHESIS FOR THE MECHANISM OF THE SINGLE CAPACITOR BIPHASIC DEFIBRILLATION WAVEFORM.
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The primary hypothesis of the "burping" model, for the biphasic waveform, is that the first phase leaves a residual charge on the membranes of some cells, which can then reinitiate fibrillation. The second phase diminishes this charge, reducing the potential for refibrillation. Thus the biphasic first phase may have a lower strength than a monophasic shock of equivalent performance (which must synchronize a larger critical mass to protect from refibrillation). A quantitative model was developed to calculate the residual membrane voltage, V_m, assuming a 3 ms membrane time constant. It was assumed that the amplitude of the first phase would be related to the deviation of V_m from zero, hence predicted by V_m^2. The model was evaluated on the data of three relevant published studies comparing biphasic waveforms. The model explained 79% of the variance in the first phase amplitude. The use of other time constants such as 1,2,4, and 6 ms yielded poorer correlations. The model was then used to predict optimal durations for various defibrillator capacitances and electrode resistances.

COMPARISON OF EFFICIENCY OF MONOPHASIC AND BIPHASIC WAVEFORMS IN TRANSTHORACIC DEFIBRILLATION OF DOGS.
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The aim of this study was to compare the threshold of defibrillation (DFT) in 36 intact dogs (m=7.39 kg) with quasi-sinusoidal asymmetrical biphasic pulse (Gurvich) (B) and critically damped monophasic pulse (Edmark) (M). DFT was defined as the lowest pulse amplitude, that would terminate electrically induced 30 sec ventricular fibrillation. Peak voltage, current (I, amps), transthoracic resistance (TTR, Ohms), and delivered energy (DE, Joules) were measured for each pulse. Results (mean±SE): B pulse had I_2/I_1 0.51-0.58.

	I	TTR	DE
MONOPHASIC	13.3±1.1	68±2.4	35.5±5.5
BIPHASIC	8.6±0.5	69±2.3	17.5±1.8
p value	<.001		<.002

The correlation coefficients between m and I were .86 (M) and .80 (B). The regressive analysis showed: I=.74m+2.5 (M) and I=.32m+3.2 (B). The results demonstrate much larger efficiency of biphasic pulses applied for transthoracic defibrillation, than monophasic pulses.