

A cool modality to restore sinus rhythm

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Background: Slowing electrical conduction by cooling the myocardium can be used for defibrillation. We previously demonstrated the efficacy of a small cold device placed in oblique sinus (OS) in terminating atrial fibrillation (AF). However, the parameters needed to achieve effective atrial defibrillation are unknown.

Purpose: Assess effect of the size of cooled myocardium on frequency of AF termination in acute canine animal models.

Methods: Sternotomy was performed under general anesthesia in 10 acute canine experiments. AF was induced using rapid atrial pacing and intra-myocardial epinephrine and acetylcholine injections. Once AF sustained for at least 30s, either a cool (7–9°C) or placebo (body temperature) device was placed in the OS. Four device sizes were tested; 1/2x1/2, 3/4x3/4, and 1x1 inch devices and two 3/4x3/4 inch devices placed side by side simul-

taneously. Time to AF termination was recorded. Chi-squared or Fisher's exact test were used to compare the frequency of arrhythmia termination with cooling versus placebo.

Results: A total of 166 applications were performed (89 cool vs 77 placebo) in 10 animal experiments. Overall, AF terminated in 82% of the cooling applications vs. 67.5% of placebo (P=0.03, Figure 1). For the 1/2x1/2 inch device 88% of cold applications restored sinus rhythm vs. 63.6% for placebo (P=0.05). The frequency of sinus restoration for cold 3/4x3/4, 1x1 and two 3/4x3/4 side by side devices was 86.7%, 83.3% and 70% respectively. Time to sinus restoration when achieved was within three minutes was also not significantly changed.

Conclusion: Placing a cool device in the oblique sinus can terminate AF and efficacy is not affected by the size of device.

