Abstract 14074: Low-Level Electromagnetic Fields Attenuate the Inducibility of Atrial Fibrillation

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Originally published 11 Nov 2019 | Circulation. 2019;140:A14074

Abstract

Introduction: Recent research suggests that autonomic nervous system (ANS) dysfunction contributes to the initiation and maintenance of AF, and several studies have demonstrated the effectiveness of modulation of the ANS in suppressing AF. Several studies have indicated that low-level electromagnetic fields (LL-EMF) are capable of stimulating ANS activity, and have been shown to suppress AF in an animal model. The purpose of this study was to assess the safety and efficacy of LL-EMF in suppressing AF in humans.

Hypothesis: We hypothesized a reduction in the duration of pacing-induced AF after exposure to a LL-EMF.

Methods: Patients (n=13) presenting to the electrophysiology lab for ablation of paroxysmal AF were randomized 1:1 to a sham stimulation protocol or active stimulation, which consisted of application of a low-level EMF (3.2×10^{-8} G at 0.89 Hz) via a helmholtz coil applied around the head and upper neck. An initial attempt was made to induce AF by rapid atrial pacing. The assigned protocol was then run for 60 minutes prior to any radiofrequency energy or cryoballoon application, after which attempts were again made to induce AF by rapid atrial pacing. The primary endpoint of the study was the duration of pacing-induced AF after the 1-hour protocol compared between sham and LL-EMF.

Results: Compared to the sham group, pacing-induced AF

duration in the LL-EMF group was 7.73 ± 3.03 minutes shorter after 1-hour of stimulation (CI 0.98 - 14.47 minutes, p = 0.03). A significantly smaller proportion of patients in the LL-EMF group experienced spontaneous firing initiating an episode of AF after 1-hour compared to sham (0/7 vs. 5/6, p = 0.0047).

Conclusions: In patients presenting to the EP lab for ablation of paroxysmal AF, LL-EMF stimulation results in significantly shorter episodes of pacing-induced AF, as well as a reduced likelihood of spontaneous firing initiating an episode of AF.