

Targeted Ablation of Epicardial Ganglionated Plexi During Cardiac Surgery with Pulsed Field Electroporation (NEURAL AF)

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Abstract

Background: Modulation of the cardiac autonomic nervous system (ANS) is a promising adjuvant therapy in the treatment of atrial fibrillation (AF). In pre-clinical models, pulsed field (PF) energy has the advantage of selectively ablating the epicardial ganglionated plexi (GP) that govern the ANS. Objective: This study aims to demonstrate the feasibility and safety of epicardial ablation of the GPs with PF during cardiac surgery with a primary efficacy outcome of prolongation of the atrial effective refractory period (AERP). **Methods:** In a single-arm, prospective analysis, patients with or without a history of AF underwent epicardial GP ablation with PF during coronary artery bypass grafting (CABG). AERP was determined immediately pre- and post- GP ablation to assess cardiac ANS function. Holter monitors were performed to determine rhythm status and Heart Rate Variability (HRV) at baseline and at 1 month post-procedure. **Conclusions:** This study demonstrates the safety and feasibility of epicardial ablation of the GP using PF to modulate the ANS during cardiac surgery. Large, randomized analyses are necessary to determine whether epicardial PF ablation can offer a meaningful impact on the cardiac ANS and reduce AF. **Results:** Of 24 patients, 23 (96%) received the full ablation protocol. No device-related adverse effects were noted. GP ablation resulted in a $20.7\% \pm 19.9\%$ extension in AERP ($P < 0.001$). Post-operative AF was observed in 7 (29%) patients. Holter monitoring demonstrated an increase in mean heart rate (74.0 ± 8.7 vs 80.6 ± 12.3 , $P=0.01$). There were no significant changes in HRV. There were no study-related complications.

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