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PULSE FIELD ABLATION FOR PULMONARY VEIN ISOLATION: ACUTE RESULTS FROM A MULTICENTRIC REGISTRY
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Background: Pulsed field ablation (PFA) is a nonthermal ablative modality using a strong electrical field created around a dedicated catheter to produce pores in the cellular membrane. As the amount of energy required to produce electroporation is highly tissue dependant, the atrial myocardium can be specifically targeted while sparing adjacent tissues. Theoretically, this new ablation modality could increase the safety of pulmonary vein isolation (PVI) procedures compared to PVI using thermal energies. Real-life clinical data are still lacking regarding feasibility and safety of PFA.

Objective: To assess feasibility and safety of PVI performed using PFA.

Methods: We included all patients who underwent PVI for symptomatic atrial fibrillation (AF) using PFA in 3 hospitals (6 operators) between June and December 2021. All procedures were performed under general anaesthesia or deep sedation. After patients received IV heparin and achieved ACT ≥ 300 s, a 12 Fr multi-electrode pentaspline PFA catheter (Farawave, Farapulse Inc.) was advanced through a 13 Fr deflectable sheath into the left atrium. The catheter was positioned so that the splines achieved circumferential contact at the PV antra. 2 applications (2.5 sec and 2 kV per application) were performed in the “basket” configuration, then the catheter was slightly rotated (30-40°) before delivery of 2 additional applications. This sequence of ablation was repeated in the “flower” configuration. This protocol was applied at each PV. PVI was assessed with the Farawave catheter.

Results: The population consisted of 80 patients (42 paroxysmal AF, 38 persistent AF < 6 months) with a mean age of 61 ± 13 yo. Left atrial dimension was normal in 42 patients (52%), and enlarged in 38 (48%). The mean procedure duration was 55 ± 23 min, and mean fluoroscopy duration was 20 ± 10 min (3.5 ± 3.1 Gy.cm²). The pulmonary vein signal completely disappeared after the first PFA application for each targeted vein and PVI was confirmed for all veins in all patients at the end of the procedure. Pericardial effusion occurred in 3 patients (3.8%), 2 requiring percutaneous drainage. No other complications were observed.

Conclusion: PVI performed with PFA is safe and feasible without compromising procedure and scopy durations. Further data are necessary regarding mid- and long-term efficacy.
without an implanted ICD were analyzed within one year follow-up.

**Results:** This study consisted of 102 patients, including 57 without an ICD and 45 with an ICD. Baseline characteristics were similar between groups, with the exception a greater prevalence of diabetes among patients with an ICD (No ICD: 14% vs ICD: 31%; \(p=0.037\)). There was no difference in baseline LVEF between groups (No ICD: 28% \(\pm\) 7% vs ICD: 27% \(\pm\) 6%; \(p=0.586\)). Procedural outcomes for both groups, including arrhythmia-free survival, were similar at 1 year (Figure 1). Patients without an ICD had a greater mean improvement in LVEF compared to patients with an ICD (+17% \(\pm\) 10% vs +5% \(\pm\) 10%, respectively; \(p=0.001\)). Among patients without an ICD, 33 of 44 (75%) had LVEF >35% at follow-up, including 25 of 31 (81%) with nonischemic cardiomyopathy and 8 of 13 (62%) with ischemic cardiomyopathy.

**Conclusion:** Most patients undergoing AF ablation with LVEF \(\leq\) 35% without an implanted ICD experienced improvement in LVEF to >35%, regardless of cardiomyopathy etiology. Patients without an ICD had significantly greater improvement in LVEF compared to patients with an implanted ICD. The role of rhythm-control prior to primary prevention ICD implantation for patients with LVEF \(\leq\) 35% requires further investigation.

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**PRECLINICAL FEASIBILITY OF LINEAR ABLATION USING A FOCAL PULSED FIELD ABLATION CATHETER INTEGRATED WITH AN ELECTROANATOMICAL MAPPING SYSTEM**

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**Background:** ‘One-shot’ pulsed field ablations (PFA) catheters that are capable of pulmonary vein isolation are currently being evaluated and can have significant impact on procedural efficiency. However, there is a need for delivering flexible lesion sets as well with PFA, that address more advanced forms of atrial fibrillation and atypical flutters. An 8 Fr catheter (Farapoint, Boston Scientific) capable of delivering focal PFA has been developed to allow for delivery of various lesion sets by using a 3-D mapping system (Rhythmia, Boston Scientific).

**Objective:** To assess the feasibility and safety of linear ablation along the cavo-tricuspid isthmus (CTI) in healthy swine.

**Methods:** Three swine underwent transfemoral venous access under general anesthesia. After creating 3D high density electroanatomic maps, the study PFA catheter was maneuvered to deliver lesions (1.8-2.0 kV/application) along the CTI using a deflectable sheath. Catheter-tip location was tagged to ensure lesion overlap and contiguity. Post-ablation maps were then created to identify lesions and to assess conduction block, following which the animals were humanely sacrificed. Lesion delivery was observed using intracardiac echocardiography.

**Results:** The study catheter was maneuvered with electroanatomic map guidance and 3 of 3 (100%) CTI lines were successfully created. The number of applications required to achieve block were 6, 10 and 7, translating to a total PFA time of 13.2 sec, 22 sec and 14.4 sec, respectively. There were no complications and gross necropsy demonstrated wide transmural lesions along the CTI line (Figure). Minimal microbubbles were noted on intracardiac echography.

**Conclusion:** The creation of linear lesions using PFA can be achieved with procedural safety and efficiency using a focal catheter compatible with an electroanatomic mapping system.