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Pulsed field ablation for the treatment of atrial fibrillation aided by intracardiac echocardiography to achieve pulmonary vein isolation with anchor lesion formation - feasibility and one-year outcomes

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Introduction: Pulsed field ablation is a novel catheter ablation method used for treatment of atrial fibrillation. This method has shown favorable outcomes with potentially less life-threatening complications when compared to traditional thermal ablation approaches[1]. The use of intracardiac echocardiography can facilitate optimal catheter positioning and contact, potentially improving lesion formation and clinical outcomes.

Patients and Methods: This was a retrospective, single center analysis. Consecutive patients with paroxysmal and persistent atrial fibrillation that underwent pulsed field ablation between April 2023 and November 2024 at University Hospital Centre Zagreb were included in the study. All procedures were performed using pentaspline catheter guided by both diascopy and intracardiac echocardiography. Anterior anchor lesions were formed in addition to standard pulmonary vein ablation protocol in all cases. Both anterior and posterior anchor lesions were performed in patients that received posterior wall ablation. In redo procedures a 3D maps were created with dedicated mapping systems before and repeat pulmonary vein isolation. A one-year follow-up observing arrhythmia recurrence was performed to evaluate clinical outcomes. Follow up consisted of 3,6-, and 12-month visits with 24-hour Holter EKG, and phone calls.

Results: A total of 100 patients were included, (mean age 61.9 ± 10.7 years, 69.0% male), with paroxysmal and persistent AF (49.0% vs. 51.0%, p=0.290), preserved left ventricular ejection fraction (55.0 ± 13.8 %) and significantly enlarged left atrium (LAVI 44.4 ± 11.1 ml/m^2). Mean procedure duration was 51.2 ± 16.6 min. Complete pulmonary vein isolation was achieved in 100% of patients, mean number of total applications being 56.9 ± 15.0. Additional posterior wall ablation was performed in 54% of patients (**Table 1**). No major adverse events were observed. During a one-year follow-up, total AF recurrence-free survival was 81.0%, with no difference in arrhythmia recurrence between paroxysmal and persistent AF (7% vs. 12%, p=0.239).

Conclusions: An intracardiac echocardiography guided AF ablation using electroporation and pentaspline catheter offers favorable one-year outcomes with a good safety profile in mixed (paroxysmal, persistent and repeat procedure) AF population.

TABLE 1. Procedural characteristics.

Characteristic	Value
Fluoroscopy time, min (mean ± SD)	11.9 ± 3.8
Fluoroscopy dose, min (mean ± SD)	40.6 ± 119.6
Fluoroscopy DAP, mcGy/m2 (mean ± SD)	306.3 ± 886.5
LSPV applications, N (mean ± SD)	10.5 ± 4.1
LIPV applications, N (mean ± SD)	10.2 ± 2.9
RIPV applications, N (mean ± SD)	11.0 ± 2.4
RSPV applications, N (mean ± SD)	10.9 ± 1.7
PV applications, N (mean ± SD)	15.5 ± 10.8

DAP- dose-area product, LSPV- left superior pulmonary vein, LIPV-left inferior pulmonary vein, PV- pulmonary vein, RIPV- right inferior pulmonary vein, RSPV- right superior pulmonary vein

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LITERATURE

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