



BMH Med. J. 2025;12(2):14-16. **Editorial**

## **Pulsed Field Ablation for Atrial Fibrillation**

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### **Introduction**

Atrial fibrillation (AF) is the most prevalent sustained cardiac arrhythmia. AF increases stroke risk and cardiovascular mortality. Atrial fibrillation was managed with antiarrhythmic drugs with limited efficacy. Recently, catheter ablation is evolving with technological advances. Pulsed field ablation (PFA) is a revolutionary technique which has gained importance in interventional electrophysiology because of its safety and efficacy [1]. PFA is a novel non-thermal ablative modality with considerable safety and efficacy, for catheter ablation of atrial fibrillation. Several studies have demonstrated that progression of atrial fibrillation can be prevented by early ablation. The patient no longer requires to fail antiarrhythmic drugs before receiving ablation. In the European Real World Outcomes with Pulsed Field Ablation registry, freedom from atrial fibrillation/atrial tachycardia recurrence after 1 year was similar in patients with prior failed antiarrhythmic drug therapy compared to patients undergoing pulsed field ablation as the first-line treatment [2].

### **PFA - Effective treatment for AF**

Pulsed field ablation is an important treatment for atrial fibrillation. In the Safety and Clinical Performance Study of Catheter Ablation with the Centauri System for Patients with Atrial Fibrillation, one year freedom from atrial arrhythmia outcomes was reported using monopolar PFA delivered through contact force-sensing focal catheters [3].

Pulsed field ablation is a novel cardiac ablation modality which uses ultra-rapid electrical pulses to cause cell death by irreversible electroporation, disrupting cell membranes selectively within myocardial tissue. Thermally mediated complications can be avoided by using PFA in atrial fibrillation. In the MANIFEST-PF (Multi-National Survey on the Methods, Efficacy, and Safety on the Post-Approval Clinical Use of Pulsed Field Ablation) registry, ablation using pulsed field energy was effective in 78% of patients [4].

In the treatment of atrial fibrillation, pulsed field ablation reduces the complications associated with conventional thermal modalities, while maintaining efficacy. AdmIRE (Assessment of Safety and Effectiveness in Treatment Management of Atrial Fibrillation with the Bosense-Webster Irreversible Electroporation Ablation System), a multicenter study, confirmed the safety and effectiveness of the variable-loop PFA catheter, with low fluoroscopy exposure [5]. In the PULSED AF study (Pulsed Field Ablation to Irreversibly Electroporate Tissue and Treat AF) patients with paroxysmal or persistent symptomatic atrial fibrillation refractory to class I or III antiarrhythmic drugs were treated with pulsed

field ablation. This study demonstrated low rate of adverse events and provided effectiveness consistent with established ablation technologies [6].

The insPIRE study (Study for Treatment of Paroxysmal Atrial Fibrillation improved by Pulsed-field Ablation System with Irreversible Electroporation), confirms the safety and effectiveness of pulmonary vein isolation with pulsed-field ablation using a variable-loop catheter with three-dimensional mapping integration: An optimal number of PFA applications resulted in improved one year success rate of about 80% [7]. PFA has the capability to create rapid, selective lesions in myocytes and it provides enhanced safety, reduced procedural times and comparable efficacy to thermal ablation [8,9]. Pulmonary vein isolation is an important strategy for the treatment of paroxysmal atrial fibrillation. The FARA-Freedom Study evaluated the long-term efficacy and safety of PFA using the pentaspline catheter for paroxysmal atrial fibrillation.

Pulmonary vein isolation using a pentaspline PFA catheter was effective in treating patients with paroxysmal atrial fibrillation and demonstrated favourable safety [10]. PFA has the ability to achieve pulmonary vein isolation rapidly and with minimal complications. PFA will reduce procedure times and there is lower incidence of esophageal and phrenic nerve damage [1]. In the PLEASE-AF study, novel hexaspline PFA catheter demonstrated pulmonary vein isolation with excellent safety profile [11]. The PFA system proved to be fast, safe and effective in patients with paroxysmal and persistent atrial fibrillation [12].

## Conclusion

Atrial fibrillation is associated with increased morbidity and mortality. Catheter ablation is the single best therapy for AF. PFA has emerged as the novel non-thermal energy source, which causes irreversible electroporation of cardiomyocytes without damaging adjacent structures. This will prevent the non-selective damage associated with traditional thermal ablation methods like radiofrequency or cryoablation. PFA offers safer, faster and effective treatment for atrial fibrillation.

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