# Robotic-assisted 3D Mapping and Targeted Ablation of Early Pulse Field Ablation Failure For Persistent Atrial Fibrillation

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**Background:**

- Pulse Field Ablation (PFA) → cardiac cell death through nonthermal irreversible electroporation.
- Benefits: minimal spreading, shorter procedural time, safer and potentially better long-term outcomes.
- Early trials → variable effectiveness when PFA is extended beyond pulmonary vein isolation for treatment of persistent AF (PerAF).
- Evidence behind symptomatic, early (≥ 90 days) recurrence of atrial arrhythmia (ERAT) remains scarce.

**Purpose:** To assess early outcomes of robotic-assisted epicardial 3D mapping and ablation for patients with PerAF experiencing post-PFA ERAT

**Methods:**

All PerAF patients s/p PFA (Pentaspline/Farapulse)

→ Ø PerAF resolution
Ø Refusing additional procedures
Ø High-risk surgical candidates

ERAT ≥ 90 days → Symptomatic, Refractory to class I/III AAD and/or DCCV

Robotic-assisted 3D epicardial mapping (EnSite)/targeted ablation
+ Ligament of Marshall, left atrial ridge ("Warfarin ridge")
+ LAAO

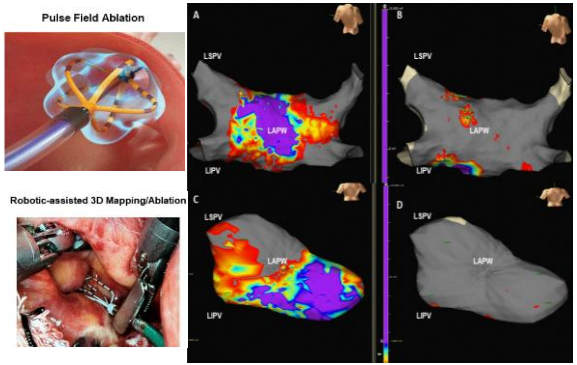
Rhythm follow-up
(Holter or Loop recorder) @ 12 months

I Freedom from atrial arrhythmia >30 s, off class I/III antiarrhythmic drugs (AAD)

II Re-interventions, AF-related readmissions, Ø class I/III AAD

**Results:**

| | Post PFA ERAT (n= 9) |
|---|---|
| Age | 70 [57-78] |
| Gender (F, %) | 33 |
| BMI (Kg/m²) | 34.1 [24.1-43.9] |
| LVEF (%) | 61.5 [52-74] |
| LAVI (ml/m²) | 46.8 [25.1-85.1] |
| $CHA_2DS_2VASc$ | 3.3 [0-6] |
| HAS-BLED | 1.9 [0-3] |
| Prior GI bleed/CVA (n, %) | 4 (44) |
| AF Duration (months) | 85.3 [12-201] |
| Pre-op PM/ICD/CRT (%) | 0 |
| Prior catheter ablations (%, range) | 55 [1-4] |
| Prior DCCV (n, %) | 7 (77.8) |
| Class I/III AAD (n, %) | 5 (66.7) |
| OAC (n, %) | 8 (88.9) |
| Mortality (%) | 0 |
| Morbidity (%) | 0 |
| LOS (days, range) | 1 [1] |
| F/U Duration (months, range) | 14.3 [12-20] |
| Freedom from AF at 1 year (n, %) | 7 (77.8) |
| LAA confirmed occlusion (%) | 100 |
| Re-intervention (n, %) | 1 (11) |
| AF-related readmission (n, %) | 1 (11) |
| Discontinuation class I/III AAD at 1 year | 50 |




**Conclusions:**

- Robotic-assisted 3D epicardial mapping + targeted ablation may improve clinical outcomes for PerAF patients experiencing post-PFA ERAT.
- Epicardial LAAO may further benefit high-risk patients intolerant to anticoagulation.
- Epicardial-endocardial dissynchrony remains an important prognostic feature that may benefit from a hybrid approach when advanced substrate is present.