Hybrid Epicardial-Endocardial Post PFA Endocardial Ablation: A Case Study

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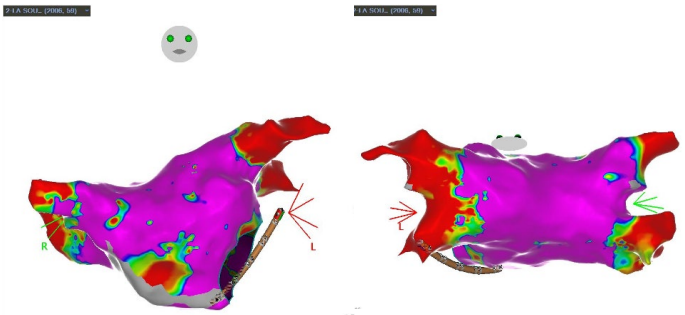
The patient is a 77-year-old male physician with a history of atrial fibrillation (AF), initially diagnosed on June 1, 2023. He underwent an attempted electrical cardioversion on June 20, 2023. Due to ongoing symptomatic AF, dofetilide therapy was initiated on May 8, 2024, followed by a successful cardioversion on May 9, 2024.

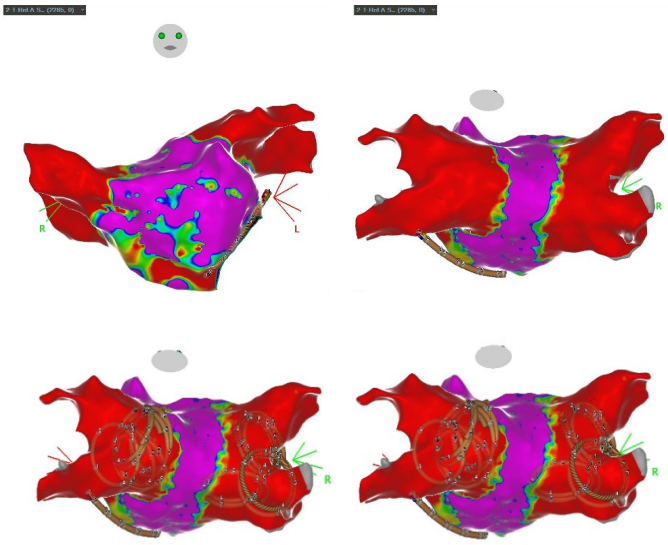
The patient was implanted with a dual-chamber pacemaker for sick sinus syndrome in December 2023. Despite pharmacologic management and rhythm control efforts, he continued to experience recurrent symptomatic AF episodes, as documented via pacemaker monitoring.

On June 12, 2024, the patient underwent catheter ablation using the Boston Scientific Farawave™ pulse field ablation (PFA) catheter. Successful isolation of all four pulmonary veins (PV) was acutely achieved **(Figure 1)**.

Figure 1.
Pre-Map Prior to PV Isolation with PFA, June 2024



Post-Map Demonstrating Acute PV Isolation After PFA, June 2024



Despite these interventions, the patient experienced early and persistent recurrence of AF. The patient resumed dofetilide therapy but opted to pursue a hybrid ablation approach rather than undergo a repeat PFA procedure targeting the posterior wall.

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Hybrid Epicardial Ablation — Stage 1
In July 2025, bilateral video assisted thoracoscopic surgical (VATS) epicardial ablation using AtriCure Isolator® Synergy (EML and EMR) clamps and an Isolator® Linear Pen (MLP1) as well as clipping of the left atrial appendage (LAA) with AtriClip® were conducted. Briefly, four ports were placed into each side of the chest to allow for opening of the pericardium, cardiac dissection, and ablation.

After opening of the pericardium and cardiac dissection, epicardial mapping with Abbott Advisor™ HD grid was performed and revealed signal in the right inferior PV as well as the posterior wall. Using an "all bipolar clamp", or ABC technique, PVs were electrically isolated as well as the entire posterior left atrial wall. Additionally, an anterior mitral line was ablated from the superior PVs to the anterior mitral annulus and a line was ablated to the base of the LAA. An appropriately sized AtriClip® was placed at the base of the appendage to intersect with the ablation lines.

At the end of the case, both epicardial electroanatomic mapping as well as pace mapping revealed isolation of the PVs and posterior left atrial wall **(Figure 2a)**.

Hybrid Endocardial Ablation — Stage 2
In August 2025, endocardial ablation performed using a Johnson and Johnson MedTech Carto™ mapping system and an Octaray™ mapping catheter to create a full electroanatomy (EA) map of the left atrium. Pacing with the Octaray confirmed isolation of all four PVs and left posterior wall. The EA map revealed evidence of epicardial linear ablation from the right superior PV toward the mitral annulus anteriorly, and a separate linear ablation from the left superior PV toward the mitral annulus anteriorly. These two lines converged approximately 1.5 cm shy of the true mitral annulus. Both linear lesion sets failed to demonstrate transmittal block, therefore endocardial ablation was performed using the Biosense QDOT Micro™ RF catheter. A line of ablation was performed from the left superior PV (LSPV) toward mitral annulus, and a separate linear ablation from the LSPV to the convergence of the epicardial linear ablation. Pacing confirmed bidirectional block of the mitral flutter line, and complete isolation of the anterior roof **(Figure 2b)**.

Less than 1 month after the second stage post-Hybrid, no atrial arrhythmia recurrences have occurred.

Figure 2a. Stage 1 – Hybrid Epicardial Ablation

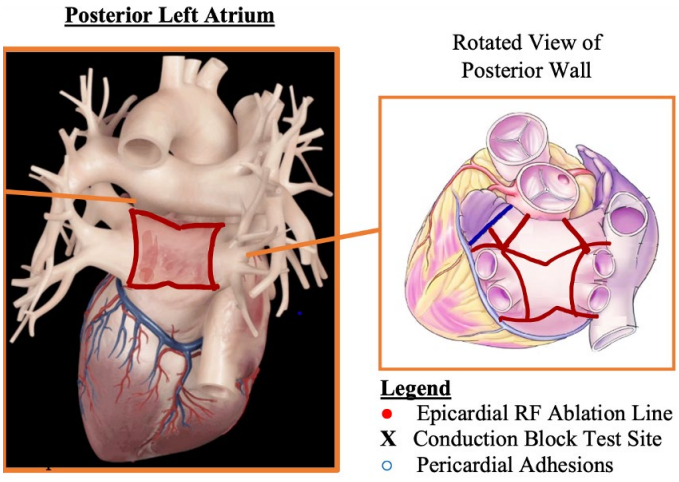


Illustration of the lesion set along the posterior left atrium

Mapping images pre-and post-epicardial ablation

PRE/POST MAPPING WITH THE ABBOT HD GRID

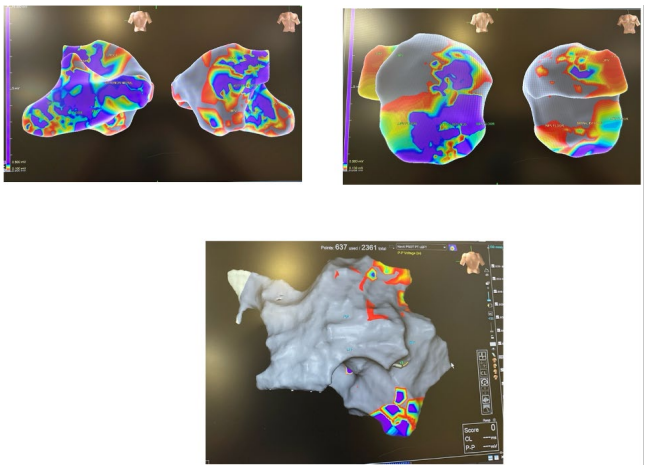
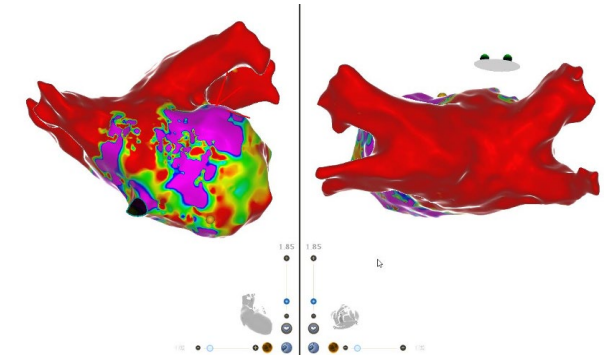
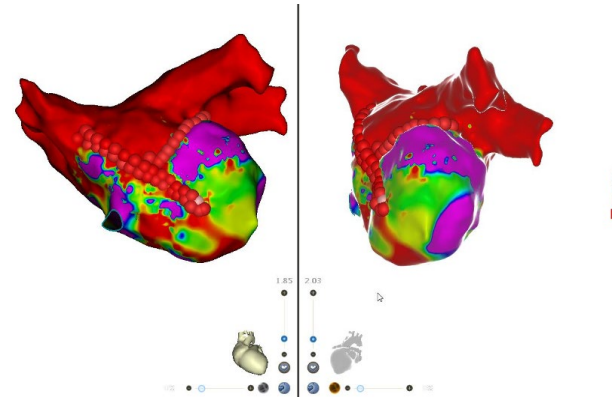


Figure 2b. Stage 2 – Hybrid Endocardial Ablation

Map before endocardial ablation



Map after endocardial ablation



Conclusion

In this case report, hybrid epicardial-endocardial ablation effectively reduced incidence of recurring atrial arrhythmias in a patient who previously underwent failed endocardial PV isolation with PFA. Since undergoing hybrid, the patient has discontinued antiarrhythmic medication and has returned to normal activity without limitation.

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U.S. Indications for AtriClip:
The AtriClip LAA Exclusion System is indicated for the exclusion of the left atrial appendage, performed under direct visualization[1], in conjunction with other cardiac surgical procedures.

[1]Direct visualization, in this context, requires that the surgeon is able to see the heart directly, with or without assistance from a camera, endoscope, etc., or other appropriate viewing technologies.

U.S. Indications for Isolator Synergy Clamps:
The ATRICURE Bipolar (Transpolar) System is intended to ablate soft tissue during General surgical procedures.

U.S. Indications for Isolator Linear Pen:
The Isolator linear pen is a sterile, single use electrosurgery device intended to ablate cardiac tissue during cardiac surgery using radiofrequency (RF) energy when connected directly to the ASU/ASB or MAG in Ablation mode. The Isolator linear pen may be used for temporary cardiac pacing, sensing, recording, and stimulation during the evaluation of cardiac arrhythmias during surgery when connected to a temporary external cardiac pacemaker or recording device.

Indications for Biosense QDOT Micro™ RF:
The ***Biosense QDOT Micro™ RF*** *system is indicated for the treatment of* ***Type I atrial flutter*** *in patients aged 18 or older and* ***drug-refractory recurrent symptomatic paroxysmal atrial fibrillation****. It is used in conjunction with a compatible radiofrequency generator and when used with a compatible three-dimensional electroanatomic mapping system. The system is designed to provide temperature control through automatic adjustment of power and fluid output based on real-time temperature measurement, enhancing the efficiency and efficacy of the ablation procedure.*

Indications for Octaray™ Mapping Catheter:
The ***OCTARAY™ Mapping Catheter with TRUEref™ Technology*** *is indicated for the* ***electrophysiological mapping of cardiac structures*** *in the heart, including the recording or stimulation of the atrial and ventricular regions. It is intended to obtain electrograms in these regions and provides location information when used with compatible versions of the CARTO® 3 EP Navigation System. The catheter is designed to improve the accuracy and efficiency of catheter ablation procedures for treating cardiac arrhythmias, such as atrial fibrillation (AFib) and premature ventricular contrction (PVC).*

Indications for CARTO® 3 System:
The intended use of the CARTO 3® System is catheter-based cardiac electrophysiological (EP) procedures. The CARTO 3® System provides information about the electrical activity of the heart and about catheter location during the procedure. The system can be used on patients who are eligible for a conventional electrophysiological procedure. The system has no special contraindications

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