

ABSTRACT-ACC'09

Duty-cycled, unipolar-bipolar RF ablation via multi-electrode catheter in patients with paroxysmal atrial fibrillation

Background: Techniques for catheter ablation of atrial fibrillation (AF) continue to improve, but often require complex equipment, high level of operator skill, and a long learning curve. **Methods:** To simplify AF ablation, we investigated a system featuring a multi-channel radiofrequency (RF) generator that simultaneously delivers duty-cycled, bipolar-unipolar energy to operator selectable electrodes of a decapolar circular catheter (PVAC, Ablation Frontiers) for achieving pulmonary vein (PV) isolation via antrum ablation. RF was delivered in a temperature-controlled manner to achieve a target of 55-60 C° with power limited to 10W per electrode. PV angiography was performed to facilitate identification of the PV ostium. End-points are disappearance of all PV potentials and >70% reduction of the local signals at the antrum. PV isolation was confirmed by use of a circular mapping catheter. **Results:** Since Sept. 2007 we have treated 55 patients with paroxysmal AF, aged 61±10 years, using this technique. Average number of RF applications per PV was 8±4. Procedure time was 201±44 min and fluoroscopy time was 41±10 min. No complications were observed. CT/MRI performed pre-procedure and at 2-4 months follow up ruled out asymptomatic PV stenosis. At 10±4 (3-18) months follow up, Holter monitoring demonstrated freedom of AF in 18/34 (53%) and ≥ reduction of AF burden in 12/34 (35.3%) patients. Total effective rate 88%. **Conclusion:** This proposed single-catheter method is safe, efficient, and feasible for AF ablation and has early results comparable to those of widely reported techniques. In addition, simplified catheter manipulation, shorter learning curve, shorter procedure time and independence from 3D-mapping system may make the method available to a larger number of centers.

BACKGROUND

Techniques for catheter ablation of atrial fibrillation (AF) continue to improve, but often require complex equipment, high level of operator skill, and a long learning curve.

METHODS

A novel system for simplifying AF ablation:

A multi-channel radiofrequency (RF) generator (Fig. 1 Left) for simultaneous delivery of duty-cycled, bipolar-unipolar energy to up to 16 channels of operator selectable electrodes.
temperature-controlled
target temp 55-60 C°
power ≤ 10W per electrode
60 seconds per application
bipolar:unipolar = 4 :1, 2:1 or 1:1

A decapolar circular catheter (PVAC, Ablation Frontiers, Fig.1 Right) for achieving pulmonary vein (PV) isolation via antrum ablation.

PV angiography:

Of all PVs to facilitate identification of the PV ostium.

End-points:

Disappearance of all PV potentials

>70% reduction of the antrum signals

PV isolation was confirmed by use of a circular mapping catheter.

Duty-cycled, unipolar-bipolar RF ablation via multi-electrode catheter in patients with paroxysmal atrial fibrillation

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RESULTS

55 patients with paroxysmal AF, 61±10 years
Average RF applications 8±4/PV
Procedure time: 201±44 min
fluoroscopy time: 41±10 min

CT/MRI before and at 2-4 months: no PV stenosis
No other complications

34 patients follow up >3 months: 10±4 (3-18) months
including 3-7 days' Holter ECG

After a single procedure with PVAC:

AF free 18/34 (53%) patients
≥ 90% reduction of AF burden: 12/34 (35.3%) patients
Total effective rate 88% (9 patients on AA)



Fig. 1. The RF generator and the PVAC catheter .

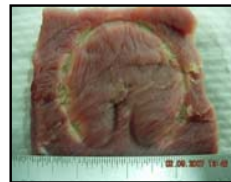


Fig. 2. In-vitro Lesion Characterization, showing deep, contiguous lesions.

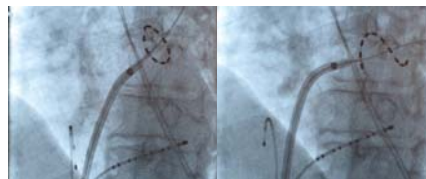


Fig. 3. LAO views of the PVAC catheter at the antrum (Left) and partially inside (right) the LSPV (for checking PV isolation or for getting better contact of the proximal electrodes.

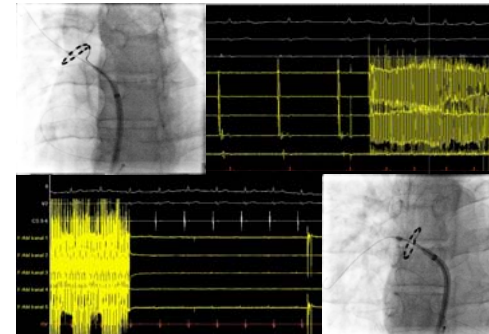


Fig. 4. ECGs from RSPV before and after 5 RF-applications (4:1). Note the tissue contact of the catheter can be modified by placing the guide-wire into different branches of the PV.

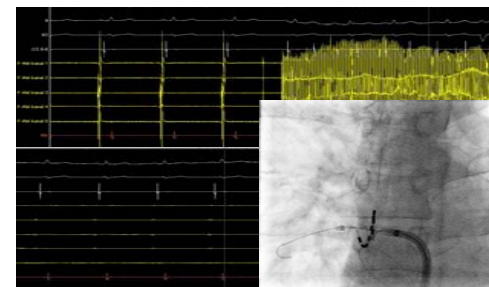


Fig. 5. ECGs from RIPV before and after 4 RF-applications (4:1).



Fig. 6. Monitoring electrical isolation (arrow) with another circumferential catheter (ProMap guidewire) through the middle lumen of the PVAC catheter.

CONCLUSIONS

This single-catheter technique is safe, efficient, and feasible for AF ablation and has early results comparable to those of widely reported techniques.

In addition, simplified catheter manipulation, shorter learning curve, shorter procedure time and independence from 3D-mapping system may make the method available to a larger number of centers.