

A Patient With Typical Atrial Flutter: Does Catheter Ablation Cure? Or Is It More Complicated?

Atrial flutter (AFL) is a distinct arrhythmic entity with a recognizable ECG phenotype resulting from a well-characterized mechanism. AFL usually refers to the “typical” form of AFL, which represents about 90% of patients who present with AFL, and for whom there is a large clinical experience focusing on natural history, long-term risks and treatment options and outcomes. This form of AFL has sometimes also been called “common” AFL or “cavo-tricuspid isthmus (CTI) - dependent” AFL. Typical AFL results from a single reentrant circuit located in the right atrium, revolving around the tricuspid annulus. An area of slow conduction exists in the posterior-inferior aspect of the circuit, with a fully excitable gap. It is believed that most circuits utilize an anatomic or functional obstacle in the posterior right atrium, such as the crista terminalis and inter-caval region.

AFL can be diagnosed from the 12-lead ECG (Figure 1). Classically, there are flutter waves that have a characteristic and constant morphology, polarity and cycle length, with a rate of about 300 bpm or 200 ms. The flutter waves are primarily negative in the inferior leads

and may take on a “sawtooth” pattern. The flutter wave is upright in V1 and inverted in V6. Most clinical examples of AFL conduct from atria to ventricles in a 2:1 ratio.

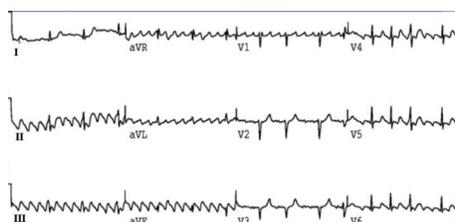


Figure 1. Classic ECG example of typical AFL

AFL is particularly resistant to rate control by medical therapy and poorly responsive to antiarrhythmic drugs, hence the strong interest in ablation as a first-line therapeutic option (Class I in guidelines). Successful ablations are typically heralded by termination of AFL, if ongoing, and the presence bidirectional conduction block across the ablation line (“CTI block”). A meta-analysis of published studies with over 10,000 patients found a procedural success rate of 94%, a 10% recurrence rate, and a complication rate of 2.6%.

The onset of AFL is almost always preceded by AF of variable duration. Antecedent AF helps promote

formation of the lateral boundary of AFL between the vena cavae, creating a line of block and thus facilitating a stable macroreentrant circuit, i.e. typical AFL. Many believe that “without AF, there is no AFL.” In this framework, AF serves as the trigger or initiating mechanism of AFL, and the two arrhythmias are inextricably linked.

Although the success rate for isolated AFL ablation is high, it became evident that many patients would have arrhythmia recurrences, usually in the form of AF rather than recurrent AFL. The development of AF would necessitate reinstitution of medical therapy, antiarrhythmic drugs, anticoagulants and consideration of repeat ablation targeting AF in many patients, a sequence of events that would be disquieting and disappointing to the patient who anticipated a curative procedure.

(continued inside)



ArrhythmiaNews

(continued from front)

Outcome data suggests that the rate of AF after elimination of AFL is significant and as high as 82%, increases over time, has consequences for patients including need for repeat ablation (targeting AF) and potential risk of stroke if patients are not anticoagulated (which is the common approach adopted by following physicians). Dr. Steinberg's recent study found more than half of patients had recurrent AF within one year of AFL ablation as documented on implantable loop recorders (1).

In probably the largest study of its kind, investigators recently published data from the Danish health registries including more than 8,000 subjects (2), and found that patients who underwent ablation of AFL had a much higher mortality rate than patients who underwent ablation of AF. The authors speculated that AF following AFL ablation may have increased stroke, heart failure and death rates.

With this background, a prospective randomized clinical pilot trial was conducted by Dr. Steinberg and colleagues (3) called "Prophylactic Pulmonary Vein Isolation During Isthmus Ablation for Atrial Flutter: The PREVENT AF Study I" to test the following hypothesis: prophylactic pulmonary vein isolation (PVI) in conjunction with AFL ablation for patients whose only clinical arrhythmia has been typical AFL (with no known AF) results in

the reduction of AF in follow-up after ablation. Many more patients in the AFL ablation only group experienced new onset AF, 52% vs 12%, during follow-up over one year ($P = 0.005$) (Figure 2). The procedure complication rates were similar in both arms.

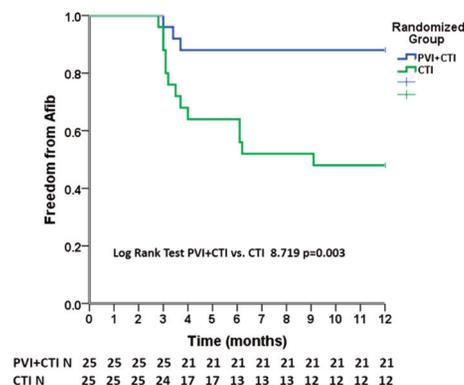


Figure 2. Kaplan-Meier curve for freedom from AF during follow-up.

PVI is currently only indicated for patients with symptomatic and established AF and is not indicated to prevent the development of, or progression to, AF. The PREVENT AF II has been designed as the first large-scale trial to test the value of performing PVI before patients have had a clinical diagnosis of AF, i.e. as a prophylactic intervention, and has been approved for review by the NIH.

The trial will be conducted at 60 pre-committed US sites, and under the overall direction of Dr. Steinberg who will serve as the Principal Investigator with the University of Rochester. Substantial support will also be provided by Medtronic and Biosense-Webster.

The primary aim of this study is to determine whether prophylactic PVI in conjunction with AFL ablation for patients whose only clinical arrhythmia has been AFL (with no known AF) results in the reduction of the composite endpoint of cardiovascular hospitalization, emergency room visit, stroke, or death, whichever occurs first during a mean 18-month follow-up. This is a prospective, multi-center, single-blind, randomized trial in which 900 patients with AFL will be randomized 1:1 to catheter ablation of the AFL alone (control group) or catheter ablation of AFL plus PVI (study group) (Figure 3).

It will be crucial to establish safety in this context and peri-procedural complications will be a major focus of the proposed trial. If the trial is successful, we anticipate that a new indication for PVI will be established (in the patient with typical AFL), and ultimately endorsed as a bona fide clinical indication in formal guidelines.

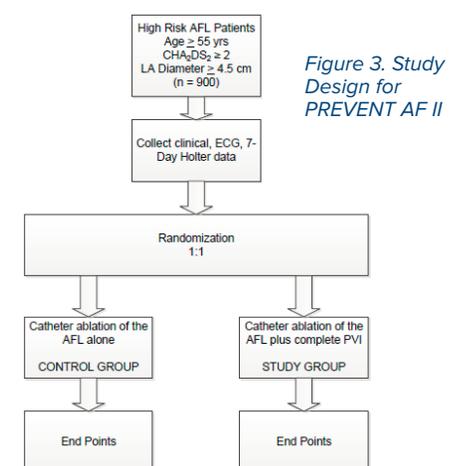


Figure 3. Study Design for PREVENT AF II



- Long-term ECG monitoring using an implantable loop recorder for the detection of atrial fibrillation after cavotricuspid isthmus ablation in patients with atrial flutter. *Heart Rhythm* 2013; 10:1598-1604.

- Death and thrombo-embolic risk after ablation of atrial flutter compared with atrial fibrillation: a nationwide cohort study. *Europace* 2017; 19:838-842.

- Prophylactic pulmonary vein isolation during isthmus ablation for atrial flutter: the PREVENT AF Study I. *Heart Rhythm* 2014; 11:1567-1572.

Recent Publications by the Summit Medical Group Electrophysiologists

- Steinberg JS, Shah Y, Bhatt A, Sichrovsky T, Arshad A, Hansinger E, Musat D. Focal impulse and rotor modulation: acute procedural observations and extended clinical follow-up. *Heart Rhythm* 2017; 14:192-197.

- Bhatt AG, Steinberg JS. Robotic-assisted left ventricular lead placement. *Heart Fail Clin* 2017; 13:93-103.

- Clarke Whalen E, Xu G, Cygankiewicz I, Bacharova L, Zareba W, Steinberg JS, Tereshchenko LG, Baranchuk A. Gender equity imbalance in electrocardiology:

a call to action. *Ann Noninvasive Electrocardiol* 2017; 50:540-542.

- Romanov A, Pokushalov E, Ponomarev D, Strelnikov A, Shabanov V, Losik D, Karaskov A, Steinberg JS. Pulmonary vein isolation with concomitant renal artery denervation is associated with reduction of both arterial blood pressure and atrial fibrillation burden: data from implantable cardiac monitor. *Cardiovasc Ther* 2017; e12264.

- Steinberg JS, Varma N, Cygankiewicz I, et al. 2017 ISHNE-HRS expert consensus statement on ambulatory ECG and external cardiac monitoring/telemetry. *Heart Rhythm* 2017; 14:e55-e96.

- Steinberg JS, Shah Y, Szepietowska B. Pharmacologic conversion during dofetilide treatment for persistent atrial fibrillation. *PACE* 2017; 40:667-671.

- Antiperovitch P, Zareba W, Steinberg JS, Bacharova L, Tereshchenko L, Farre J, Nikus K, Ikeda T, Baranchuk A. Proposed in-training electrocardiogram interpretation competencies for undergraduate and postgraduate trainees. *J Hosp Med* 2017; 8:E1-E9.

- Kalscheur MM, Saxon LA, Lee BK, Steinberg JS, Chaoqun M, Buhr KA, DeMets DL, Bristow MR, Singh SS. Outcomes of cardiac resynchronization therapy in patients with intermittent atrial

fibrillation or atrial flutter in the COMPANION trial. *Heart Rhythm* 2017; 14:858-865.

- Steinberg JS and Altman RK. Should the force be with us? *Heart Rhythm* 2017; 15:209-210.

- Steinberg JS, Shah Y, Szepietowska B. Ablation of very late recurrence after initially successful ablation of atrial fibrillation. *Clin Res Cardiol* 2018; 107:268-269.

- Steinberg JS and Altman RK. Don't neglect the electrocardiogram: P wave proves a potent predictor. *J Am Coll Cardiol Clin Electrophysiol* 2018; epub ahead of print.

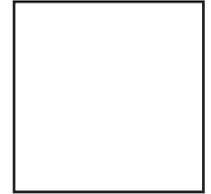
- Steinberg JS. J. Thomas Bigger, Jr. 1935-2017. *Ann Noninvasive Electrocardiol* 2018; e12530.

- Atie J and Steinberg JS. A cohort study of cardiac resynchronization therapy in patients with chronic Chagas cardiomyopathy. *Europace* 2018; epub ahead of print.





85 Woodland Road
Short Hills, NJ 07078
arrhythmia.org



CONNECT WITH US!



Visit summitmedicalgroup.com/socialmedia

SMG Electrophysiologists Are Appointed to Faculty of Seton Hall-Hackensack Meridian School of Medicine

Dr. Steinberg is the Core Professor of Cardiology and Internal Medicine, and Dr. Altman is the Assistant Professor of Cardiology and Internal Medicine, as part of the inaugural faculty at the new medical school at Seton Hall.

CONTACT US:

Jonathan Steinberg, MD



 85 Woodland Road
Short Hills, NJ 07078

 6 Brighton Road
Clifton, NJ 07012

 973-436-4155

Robert Altman, MD



 1 Diamond Hill Road
Berkeley Heights, NJ 07922

 75 E. Northfield Road
Livingston, NJ 07039

 973-436-1330

To learn more about Drs. Altman and Steinberg, visit arrhythmia.org.