



Catheter Ablation for Paroxysmal Atrial Fibrillation: Segmental Pulmonary Vein Ostial Ablation vs. Left Atrial Ablation

Oral H, Scharf C, Chugh A, et al. *Circulation* 2003;108:2355–60.

Study Question: The investigators evaluated the relative efficacy of segmental ostial catheter ablation (SOCA) to isolate the pulmonary veins (PVs) and left atrial catheter ablation (LACA) to encircle the PVs in eliminating paroxysmal atrial fibrillation (PAF).

Methods: The subjects of this study were 80 consecutive patients with symptomatic PAF selected to undergo catheter ablation. Of 80 consecutive patients with symptomatic PAF (age, 52 ± 10 years), 40 patients underwent PV isolation by SOCA and 40 patients underwent LACA to encircle the PVs. During SOCA, ostial PV potentials recorded with a ring catheter were targeted. LACA was performed by encircling the left- and right-sided PVs 1 to 2 cm from the ostia and was guided by an electroanatomic mapping system; ablation lines also were created in the mitral isthmus and posterior left atrium.

Results: The mean procedure and fluoroscopy times were 156 ± 45 and 50 ± 17 minutes for SOCA and 149 ± 33 and 39 ± 12 minutes for LACA, respectively. At 6 months, 67% of patients who underwent SOCA and 88% of patients who underwent LACA were free of symptomatic PAF when not taking antiarrhythmic drug therapy ($p=0.02$). Among the variables of age, sex, duration and frequency of PAF, ejection fraction, left atrial size, structural heart disease and the ablation technique, only an increased left atrial size and the SOCA technique were independent predictors of recurrent PAF. The only complication was left atrial flutter in a patient who underwent LACA.

Conclusions: The authors conclude that in patients undergoing catheter ablation for PAF, LACA to encircle the PVs is more effective than SOCA.

Perspective: The two ablation techniques for PAF that have been used most commonly in clinical practice have been segmental ostial ablation to isolate the PVs (SOCA) and left atrial ablation to encircle the PVs (LACA). In this study, symptomatic PAF was eliminated more reliably by left atrial ablation that encircled the PVs than by segmental ostial ablation of the four PVs, with a trend toward a shorter duration of fluoroscopy with the left atrial ablation approach. These findings suggest that left atrial ablation to encircle the PVs is preferable to segmental ostial ablation as the first approach in patients with symptomatic PAF who are appropriate candidates for catheter ablation. DM

Electrophysiological and Electrocardiographic Characteristics of Focal Atrial Tachycardia Originating From the Pulmonary Veins. Acute and Long-Term Predictors of Radiofrequency Ablation

Kistler PM, Sanders P, Fynn SP, et al. *Circulation* 2003;108:1968–75.

Study Question: What are the characteristics of pulmonary vein tachycardia (PVT) and the results of radiofrequency ablation?

Methods: Mapping and radiofrequency catheter ablation were performed in 27 patients with atrial tachycardia found to have a focal source with a pulmonary vein (PV). The mean age of the patients was 39 years. The mean duration of follow-up post-ablation was 25 months.

Results: The mean PVT cycle length was 311 ms. In all patients, PVT occurred spontaneously or was inducible with isoproterenol, but not by pacing. PVT originated in a superior PV in 78% of patients, and most foci were ostial. Radiofrequency ablation was acutely successful in all patients, although two ablation sessions were required in four patients. There were no complications. Tachycardia recurred in four patients within 1 month. Repeat ablation was successful in three of these four patients. The long-term success rate was 96%.

Conclusions: PVT usually arises at the ostium of a superior PV. Focal radiofrequency ablation of PVT has a high long-term success rate.

Perspective: The majority of focal atrial tachycardias arise in the right atrium, along the crista terminalis. Perhaps 20–30% arise in the left atrium, and approximately half of these may originate within a PV. Although they are an occasional source of focal atrial tachycardia, the muscle sleeves that surround the PVs play a more prominent role in paroxysmal atrial fibrillation (PAF). The PVs are often the source of premature depolarizations that trigger episodes of PAF and also often generate bursts of rapid activity that maintain an episode of PAF. FM

A Randomized Study of Prophylactic Catheter Ablation in Asymptomatic Patients With the Wolff-Parkinson-White Syndrome

Pappone C, Santinelli V, Manguso F, et al. *N Engl J Med* 2003; 349:1803–11.

Study Question: Is catheter ablation of the accessory pathway (AP) appropriate in asymptomatic patients found to have high-risk characteristics during electrophysiology testing?

Methods: An electrophysiology test was performed in 224 asymptomatic individuals with preexcitation on the electrocardiogram. High-risk patients were defined as patients ≤ 35 -years-old who had inducible AP-mediated tachycardia or atrial fibrillation (AF). Seventy-two high-risk patients (mean age 22 years) were randomly assigned to radiofrequency catheter ablation of the AP ($n=37$) or to no therapy

(n=35). The primary end point was the occurrence of symptomatic arrhythmic events.

Results: In the ablation group, AP ablation was successful in all patients and during a median follow-up of 27 months, two patients (5%) had a symptomatic arrhythmic event. In the control group, during a median follow-up of 21 months, 21 patients (60%) had an arrhythmic event, including a cardiac arrest in one (3%). Among the 148 low-risk patients, an arrhythmic event occurred in 4%.

Conclusions: AP ablation markedly reduces the risk of symptomatic arrhythmias in patients with high-risk characteristics (age ≤ 35 years, inducible tachycardia or AF).

Perspective: The usual clinical approach to asymptomatic preexcitation is to defer electrophysiologic testing and catheter ablation until symptomatic tachycardia occurs. The downside of this approach is that the first symptomatic tachycardia sometimes causes a cardiac arrest, as occurred in 3% of the high-risk control patients in this study. Given the high efficacy and low risk of catheter ablation, the study makes a strong case for prophylactic AP ablation in high-risk patients. The problem is that an electrophysiology test is required to identify the high-risk patients, and because cardiac arrest is an uncommon first symptom, the cost-effectiveness of this approach may be unfavorable. FM

Voltage and Activation Mapping. How the Recording Technique Affects the Outcome of Catheter Ablation Procedures in Patients With Congenital Heart Disease

de Groot NMS, Schalij MJ, Zeppenfeld K, Blom NA, Van der Velde ETV, Van der Wall EE. *Circulation* 2003;108:2099–106.

Study Question: Should unipolar or bipolar recordings be used to guide catheter ablation of complex atrial arrhythmias?

Methods: An electrophysiology procedure was performed in 44 patients (mean age 43 years; surgically corrected congenital heart disease in 17) with atrial tachycardia/flutter or atrioventricular nodal re-entrant tachycardia (AVNRT). Voltage and activation maps were created with a 3-dimensional electroanatomic mapping system, and unipolar and bipolar endocardial electrograms were recorded simultaneously.

Results: Unipolar voltages were larger than bipolar voltages and were not useful in delineating areas of scar. A bipolar voltage ≤ 0.1 mV was found to discriminate scar from healthy myocardium and voltage maps using a cutoff value of 0.1 mV were useful in guiding catheter ablation of scar-related atrial reentrant tachycardias (ART). When small or fragmented electrograms were present, bipolar recordings were more useful than unipolar recordings for constructing activation maps. Radiofrequency catheter ablation was successful in all patients with AVNRT and focal atrial tachycardia and in 84% of patients with ART and atrial flutter.

Conclusions: Bipolar electrograms are more useful than unipolar electrograms for constructing voltage maps and for recording small or fragmented electrograms.

Perspective: The main advantage of unipolar recordings is that they provide a more precise indication of local activation. However, they are more subject to noise and far-field activity and are much less useful than bipolar electrograms for recording low-amplitude or fragmented activity and for constructing voltage maps. Unipolar electrograms are preferable when precise identification of focal target sites is required (as in accessory pathway ablation), whereas bipolar electrograms are preferable when identification of areas of scar or slow conduction is required (as in scar-related atrial or ventricular tachycardia). FM

Spontaneous Conversion of Patients With Atrial Fibrillation Scheduled for Elective Cardioversion. An ACUTE Trial Ancillary Study

Tejan-Sie SA, Murray RD, Black IW, et al. *J Am Coll Cardiol* 2003;42:1638–43.

Study Question: What are the clinical features of patients with atrial fibrillation (AF) of >2 days duration that converts spontaneously to sinus rhythm (SR)?

Methods: The ACUTE study was a randomized comparison of an accelerated approach to cardioversion guided by transesophageal echocardiography (TEE) vs. a conventional approach to cardioversion after 3 weeks of anticoagulation. All patients had AF of >2 days duration. The present study analyzed 1041 patients who were not being treated with a class I or III antiarrhythmic drug at the time of enrollment.

Results: Spontaneous conversion (SC) to SR occurred in 167 of the 1041 patients (16%). SC was more common in the conventional arm (21%) than in the TEE-guided arm (11%). In a multivariate analysis, predictors of SC included a smaller left atrial size, shorter duration of AF and a NYHA functional class of I–II. The AF duration was ≤ 1 week in 51% of patients with SC. The highest proportion of patients (24%) underwent SC within 24 hours of enrollment. At 8 weeks of follow-up, SR was maintained more often in the patients with SC (87%) than in the patients without SC (49%).

Conclusions: SC of AF is associated with a smaller left atrial size, shorter AF duration, and lower functional class. Compared to patients who undergo transthoracic cardioversion, patients with SC are more likely to remain in SR over a period of 2 months.

Perspective: The study implies that rate control and anticoagulation may be the appropriate initial therapy in patients with AF for 2–7 days who have relatively normal left atria and no heart failure. In patients with these characteristics, the need for TEE and/or cardioversion may be avoided by waiting a few days to see if SC occurs. FM