Unexcitability of Ablation Line and Pulmonary Vein Isolation

Written by Toni Rizzo

Atrial fibrillation (AF) or atrial tachycardia (AT) commonly recurs after radiofrequency (RF) catheter ablation because of poor durability of pulmonary vein isolation (PVI). Daniel Steven, MD, University Heart Center, Hamburg, Germany, presented findings from a trial, based on the hypothesis that the achievement of unexcitability along the ablation line using a pace-guided approach during PVI reduces recurrences of atrial arrhythmia in patients with paroxysmal AF after PVI.

A total of 102 patients with paroxysmal AF who had failed at least 1 type I or III antiarrhythmic drug were randomly assigned to the standard technique of a circumferential mapping catheter (CMC)-guided approach (Group 1; n=50) or to a pace-guided approach (Group 2; n=52). The pace-guided approach [Soejima K et al. *Circulation* 2002] employs pacing within the scar of the ventricular myocardium with a fixed output of 10 millivolts and 2 milliseconds to identify viable myocardium within the scar. The viable myocardial cells are avoided so that they may serve as a re-entry circuit in the future. This approach was adapted for ablation of the pulmonary veins in this study.

A 3-dimensional mapping system and irrigated catheter ablation were used in both groups. Patients were monitored every 3 months with 3-day Holter monitoring and evaluation of symptoms and current medications. The procedural endpoints were entrance block that was proven by CMC in Group 1 and loss of pace-capture in Group 2. The clinical endpoint was recurrent AF or AT that lasted more than 30 seconds.

Baseline characteristics included age 62.5±10.2 years, 32% female, left atrial diameter 38±7 mm, and left ventricular function 61.2% ±6%. Successful acute isolation of all 4 veins was achieved in all patients, with no major complications in either group. The procedure duration was 138±56 minutes in Group 1 and 185±58 minutes in Group 2 (p<0.001; Table 1). Fluoroscopy time was similar in both groups.

At a mean follow-up of 14±6 months, 52% (n=26) of patients in Group 1 were free from AF or AT recurrence compared with 83% (n=43) in Group 2 (p <0.001).

Table 1. Results.

	Group 1 (CMC-Guided)	Group 2 (Pace-Guided)	p value
Patients, n	50	52	
Procedure duration (minutes)	138±56	185±58	<0.001
Fluroscopy time (minutes)	22±9	24±8	0.490
Free from AF/AT recurrence, n (%)	26 (52)	43 (83)	<0.001

AF=atrial fibrillation; AT=atrial tachycardia; CMC=circumferential mapping catheter.

Limitations of this procedure include the requirement for sinus rhythm and the need for a mapping system. Stunned tissue may not capture, and differences in success rates are related to the quality of the initial lesion set.

Prof. Steven concluded that loss of pace-capture is feasible and safe to achieve PVI. The procedure duration increases slightly, while fluoroscopy times remain unchanged. Loss of pace-capture may help to identify atrial myocardium that is responsible for later conduction recurrence. Recurrence rates are decreased when loss of pace-capture is used as an acute assessment of procedural success. Long-term outcomes remain to be determined. The use of pacing to ensure unexcitability along the PVI line has the potential to improve outcomes after PVI.

Radiofrequency Ablation versus Antiarrhythmic Drugs for AF

Written by Toni Rizzo

Recent studies suggest that pulmonary vein isolation (PVI) with radiofrequency (RF) ablation may significantly reduce the time to first recurrence and the burden of atrial fibrillation (AF) compared with antiarrhythmic drug (AAD) therapy in patients with paroxysmal AF. The primary objective of the Radiofrequency Ablation versus Antiarrhythmic Drugs for Atrial Fibrillation Treatment-2 study [RAAFT-2; NCT00392054] was to assess if catheter-based PVI isolation is superior to AADs as first-line therapy in patients with symptomatic paroxysmal recurrent AF who were not previously treated with therapeutic doses of AADs. Carlos A. Morillo, MD, McMaster University and Hamilton Health Sciences, Hamilton, Ontario, Canada, presented recent findings.

A total of 127 patients were randomly assigned to ablation (n=66) or AAD therapy (n=61) and monitored for 21

months. The primary efficacy outcome was time to first recurrence of symptomatic or asymptomatic AF, atrial flutter (AFL), or atrial tachyarrhythmia (AT). The primary safety outcome was time to first occurrence of any event in a cluster of serious complications that occur in patients in the ablation arm.

Ablation was performed in 65 (98.5%) patients, and AADs were started in 60 (98.4%) patients. Ablation was performed in 3 (4.9%) patients in the AAD arm during the treatment period. In the ablation arm, 7 (10.6%) patients started an AAD during the follow-up period.

The primary efficacy outcome was reached in 72% of patients in the AAD arm versus 55% of patients in the ablation arm (HR, 0.56; 95% CI, 0.35 to 0.90; p=0.02; Figure 1). Recurrence of symptomatic AF, AT, or AFL occurred in 59% of patients in the AAD arm versus 47% in the ablation arm (HR, 0.56; 95% CI, 0.33 to 0.95; p=0.03), while symptomatic AF occurred in 58% of patients in the AAD arm versus 41% in the ablation arm (HR, 0.52; 95% CI, 0.30 to 0.89; p=0.01). Recurrence of multiple primary outcome events using a recurrence event model was reached by 14.7% of patients in the AAD arm versus 6.6% in the ablation arm (HR, 0.33; 95% CI, 0.28 to 0.40; p=0.0001).

The primary safety endpoint was reached by 19.7% of patients in the AAD arm compared with 7.7% of patients in the ablation arm (Table 1).

Figure 1. Primary Efficacy Outcome.

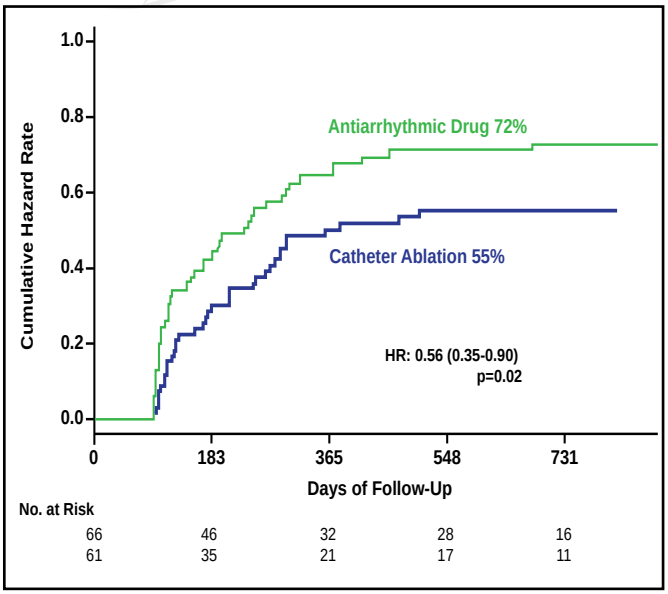

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Table 1. Primary Safety Endpoint.

Time to First Occurence	
Ablation Group	**Antiarrhythmic Drug Group**
Death (0)	Death (0)
Cardiac tamponade (6.2%)	Torsade of points (0)
Severe pulmonary vein stenosis ≥70% (1.5%)	Bradycardia leading to pacemaker insertion (0)
Atrio-esophageal fistula (0)	Syncope (3.3%)
Thromboembolism (stroke, non-CNS embolism; 0)	QRS duration prolongation .50% of baseline QRS duration (0)
Vascular complications (aterial pseudoaneurysm, arteriovenous fistula and hematoma leading to transfusion; 0)	1:1 atrial flutter (1.6%)
Phrenic nerve injury (0)	Any other significant adverse events that lead to AAD discontinuation (14.3%)
Cluster: 7.7%	**Cluster: 19.7%**

CNS=central nervous system; AAD=antiarrhythmic drug.

Dr. Morillo concluded that RF catheter PVI ablation is safe and significantly superior to AAD therapy in preventing the recurrence of symptomatic or asymptomatic AF, AFL, or AT in patients with paroxysmal AF, with a relative risk reduction of 44%. These results support the indication of RF PVI as first-line therapy for patients with paroxysmal AF.