JACC: CLINICAL ELECTROPHYSIOLOGY
VOL. 1, NO. 1-2, 2015

ISSN 2405-500X/$36.00
PUBLISHED BY ELSEVIER INC.
http://dx.doi.org/10.1016/j.jacep.2015.03.005

Safety and Efficacy of Catheter Ablation for Ventricular Tachycardia in Elderly Patients With Structural Heart Disease

Jackson J. Liang, DO,* Shaan Khurshid, MD,† Robert D. Schaller, DO,* Pasquale Santangeli, MD,* Francis E. Marchlinski, MD,* David S. Frankel, MD*

ABSTRACT

OBJECTIVES This study sought to determine the safety and efficacy of ventricular tachycardia (VT) ablation in elderly patients with structural heart disease.

BACKGROUND As patients with cardiomyopathy live longer, the number of elderly patients with VT is increasing. Catheter ablation is an effective treatment for VT; however, outcomes may differ among elderly patients.

METHODS We studied 238 consecutive patients with ischemic or nonischemic cardiomyopathies who underwent catheter ablation for VT refractory to antiarrhythmic medications. Patients were divided into 3 age groups (Group A, <65 years; Group B, 65 to 75 years; and Group C, >75 years).

RESULTS Compared with Groups A and B, patients in Group C were more likely to have ischemic cardiomyopathy, lower left ventricular ejection fraction, longer mean VT cycle length, and less likely to undergo epicardial ablation. Acute procedural success, complications, 28-day survival, and 1-year VT-free survival rates were similar across groups ($p = 0.9$, 0.3, 0.3, and 0.9, respectively). As expected, Group C patients had worse survival in long-term follow-up ($p < 0.001$).

CONCLUSIONS VT ablation can be performed in elderly patients with structural heart disease with similar efficacy and complication rates as in younger patients. VT ablation should not be withheld for older age alone. (J Am Coll Cardiol EP 2015;1-2:52–8) © 2015 by the American College of Cardiology Foundation.

Ventricular tachycardia (VT) is a major cause of death and suffering in patients with structural heart disease. Although implantable cardioverter-defibrillators (ICDs) improve survival in appropriately selected patients, ICD shocks are themselves associated with worse survival and quality of life. Antiarrhythmic medications may be effective in suppressing VT, but options are restricted in patients with structural heart disease (1). Side effects and long-term organ toxicities may further limit their usefulness (2). Catheter ablation is an effective treatment option for patients with recurrent VT (3-5). VT ablation reduces ICD shocks and may increase survival and decrease heart failure hospitalizations compared with medical therapy alone (6,7).

Medications and implantable cardiac devices have significantly prolonged life expectancy in patients with heart failure, with many surviving into the 8th decade of life and beyond (8). Elderly patients have been underrepresented in prior studies of VT ablation. Providers may be less likely to refer elderly patients for VT ablation because of concern for increased procedural risk and decreased efficacy.

We hypothesized that VT ablation could be accomplished in elderly patients with structural heart disease with similar complication rates, acute

From the *Electrophysiology Section, Cardiovascular Division, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania; and the †Department of Medicine, Massachusetts General Hospital, Boston, Massachusetts. This work was supported in part by the F. Harlan Batrus Research Fund and the Susan and Murray Bloom Fund. All authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Manuscript received January 5, 2015; revised manuscript received February 9, 2015, accepted February 17, 2015.

procedural outcomes, and long-term arrhythmia control as in younger patients.

METHODS

PATIENT POPULATION. We studied consecutive patients with structural heart disease undergoing catheter ablation for VT at the Hospital of the University of Pennsylvania between January 1, 2008, to June 1, 2011. Per institutional guidelines of the University of Pennsylvania Health System, all patients provided written informed consent both for catheter ablation, and for their anonymized medical information to be included in research studies. Study participants were divided into 3 groups according to age: <65 years (Group A); 65 to 75 years (Group B); and >75 years (Group C).

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VT ABLATION. Conscious sedation was used preferentially; general anesthesia was induced before obtaining epicardial access or when necessary for patient comfort or stability. Intravenous heparin was administered to maintain an activated clotting time above 300 s and left ventricular access obtained either via retrograde aortic or transseptal approach. An electroanatomic map (CARTO, Biosense Webster, Diamond Bar, California) was created during sinus or paced rhythm to identify areas of low voltage and abnormal electrograms, consistent with scar (9,10).

Programmed ventricular stimulation was then performed with single, double, and triple extrastimuli delivered to refractoriness at drive cycles of 600 and 400 ms. Stimulation was initially delivered from the right ventricle. If this failed to induce VT, stimulation was delivered from the left ventricle. If VT was hemodynamically tolerated, entrainment mapping was used to identify critical VT circuitry. If VT was not hemodynamically tolerated, pace mapping was performed along the scar border zone and within the scar at areas with abnormal potentials, to similarly define the VT circuit. Radiofrequency ablation was delivered using an open-irrigated 3.5-mm tip catheter (Navistar Thermocool, Biosense Webster) with power 30 to 45 W and temperature limit 42°C to achieve impedance drops of 10 to 15 Ω. When endocardial ablation failed to eliminate VT or the 12-lead electrocardiogram suggested epicardial VT exit, epicardial access was obtained using the technique described by Sosa et al. (11). Coronary angiography was performed before epicardial ablation, to ensure a safe distance from major coronary arteries.

Following ablation, VT inducibility was reassessed with the same stimulation protocol. If clinical VT remained inducible, the procedure was classified as a failure. If nonclinical VT only remained inducible, the procedure was classified as a partial success. If no VT was inducible, the procedure was classified as a complete success. Clinical VT was defined by comparison with 12-lead electrocardiograms of spontaneous VT. When 12-lead electrocardiograms of spontaneous VT were not available, stored ICD electrograms were used instead (12,13).

ABBREVIATIONS AND ACRONYMS

ICD = implantable cardioverter-defibrillator

VT = ventricular tachycardia

LONG-TERM FOLLOW-UP. Patients were evaluated clinically and with ICD interrogation 6 weeks following ablation and every 3 to 6 months thereafter. For patients not followed at the University of Pennsylvania, referring cardiologists were contacted and records reviewed. All VT recurrences were adjudicated by review of ICD electrograms or 12-lead electrocardiograms. Vital status was assessed using the Social Security Death Index.

STATISTICAL ANALYSIS. Continuous variables are expressed as mean ± SD. Differences in continuous

TABLE 1 Baseline Characteristics of Patients According to Age Group

	Age			
	<65 yrs	65–75 yrs	>75 yrs	p Value
Demographics and comorbidities				
N	122	69	47	
Male (%)	88.5	92.8	91.5	0.6
Age (yrs)	53.4 ± 9.8	69.6 ± 2.9	79.4 ± 2.8	<0.001
Ischemic cardiomyopathy (%)	41.8	63.8	74.5	<0.001
Nonischemic cardiomyopathy (%)	58.2	36.2	25.5	<0.001
Left ventricular ejection fraction	33.5 ± 15.3	28.2 ± 12.3	27.8 ± 13.9	0.01
New York Heart Association heart failure class	1.7 ± 0.8	2.1 ± 0.8	1.9 ± 0.8	0.002
History of cardiac surgery (%)	33.6	36.2	55.3	0.03
Hypertension (%)	46.7	73.9	57.4	0.001
Diabetes mellitus (%)	22.1	30.4	21.3	0.4
History of atrial fibrillation (%)	45.1	47.8	57.4	0.4
Creatinine (mg/dl)	1.2 ± 0.4	1.6 ± 0.9	1.5 ± 0.9	0.001
Ventricular arrhythmia history				
Implantable cardioverter defibrillator present (%)	90.2	94.2	95.7	0.4
Cardiac resynchronization therapy device present (%)	25.4	43.5	53.2	0.001
Ventricular tachycardia storm (%)	46.7	49.3	55.3	0.6
Previous ventricular tachycardia ablation (%)	42.6	42.0	17.0	0.006
Number of previous ventricular tachycardia ablations	0.7 ± 1.0	0.6 ± 0.9	0.3 ± 0.9	0.07
Medication usage				
Beta-blocker (%)	81.1	91.3	80.1	0.1
Angiotensin-converting enzyme inhibitor or angiotensin receptor blocker (%)	67.2	76.8	66.0	0.3
Diuretic (%)	50.8	72.5	66.0	0.009
Amiodarone (%)	54.1	71.0	72.3	0.02
Other antiarrhythmic drug (%)	67.2	63.8	70.2	0.8

Values are % or mean ± SD.