



JACC

Clinical Electrophysiology

JULY 2017
VOLUME 3
NUMBER 7

*A Journal of the
American College of Cardiology*

INSIDE THIS ISSUE

STATE-OF-THE-ART REVIEW

Therapeutic Approaches to Atrial Fibrillation Ablation Targeting Atrial Fibrosis

Hans Kottkamp, Doreen Schreiber, Fabian Moser, Andreas Rieger

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Atrial fibrosis is the fundamental histopathologic finding in atrial fibrillation (AF) patients and an important predictor of ablation failure beyond pulmonary vein isolation. There is wide variation in the extent and localization of left atrial fibrosis in patients with paroxysmal and nonparoxysmal AF. Box isolation of fibrotic areas is an effective rhythm control concept in patients with paroxysmal AF despite durable pulmonary vein isolation, and this strategy has recently been implemented successfully in initial AF ablation procedures in addition to pulmonary vein isolation for patients with nonparoxysmal AF. In contrast, the time for "empirical" lines or other nonindividualized substrate modifications seems over.

FOCUS ON THE ECG IN VENTRICULAR TACHYCARDIA

12-Lead Electrocardiogram to Localize Region of Abnormal Electroanatomic Substrate in Arrhythmogenic Right Ventricular Cardiomyopathy

Cory M. Tschabrunn, Haris M. Haqqani, Pasquale Santangeli, Erica S. Zado, Francis E. Marchlinski

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QRS fragmentation (fQRS) is frequently observed in patients with arrhythmogenic right ventricular cardiomyopathy (ARVC). This study evaluated the relationship between electrocardiogram (ECG) fQRS and right ventricular (RV) endocardial (ENDO) and epicardial (EPI) electroanatomic substrate abnormalities in 30 patients with ARVC and ventricular tachycardia. A total of 25 patients had fQRS in ≥ 2 contiguous ECG leads. Overall, ENDO and EPI bipolar low voltage area and late potential density increased as the number of fQRS ECG regions (0 to 3) increased. Inferior fQRS most frequently identified EPI inferior substrate, anterior fQRS identified RV EPI mid-free wall substrate, and basal superior fQRS identified ENDO and EPI RV outflow tract substrate abnormalities.



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■ EDITORIAL COMMENT

Still an Important Tool: The Role of the 12-Lead ECG to Localize Abnormal Electroanatomic Substrate in Arrhythmogenic Right Ventricular Cardiomyopathy

Melvin M. Scheinman, Kurt S. Hoffmayer

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Utility of Conventional Electrocardiographic Criteria in Patients With Idiopathic Ventricular Tachycardia

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Anil V. Yadav, Babak Nazer, Barbara J. Drew, John M. Miller, Hicham El Masry, William J. Groh, Andrea Natale, Nassir Marrouche, Nitish Badhwar, Yanfei Yang, Melvin M. Scheinman

Conventional electrocardiographic criteria used to distinguish ventricular tachycardia (VT) from supraventricular tachycardia (SVT) with aberrancy were developed from cohorts of patients with structural or ischemic heart disease and have not been applied to patients with idiopathic VT. Application of these criteria to a cohort of 115 patients with idiopathic VT yielded a sensitivity of 82%, significantly lower than that of the control group of patients with post-myocardial infarction VT (95%; $p < 0.01$). Furthermore, there was site-specific heterogeneity to sensitivity among idiopathic VT, with Purkinje and septal (including septal outflow tract) sites of origin demonstrating the lowest sensitivity.

Value of a Posterior Electrocardiographic Lead for Localization of Ventricular Outflow Tract Arrhythmias: The V_4/V_8 Ratio

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Fengxiang Zhang, David Hamon, Zhen Fang, Yan Xu, Bing Yang, Weizhu Ju, Jason Bradfield, Kalyanam Shivkumar, Minglong Chen, Roderick Tung

The aim of the study was to prospectively evaluate the value of a dedicated electrocardiographic posterior lead V_8 to localize premature ventricular complexes (PVCs) between the right ventricular outflow tract and left ventricular outflow tract for catheter ablation. In 174 patients undergoing ablation of outflow tract PVCs, a V_4/V_8 ratio >3 had a sensitivity of 88% with a specificity of 77% for left-sided locations. At a cutoff of >2.28 , the V_4/V_8 index had a sensitivity of 67% with a specificity of 98%. In the prospective validation cohort of PVCs with a V_3 transition, the V_4/V_8 index demonstrated 100% specificity and PPV. A V_8 lead may provide incremental diagnostic value for localizing outflow tract PVCs.

Real-Time Localization of Ventricular Tachycardia Origin From the 12-Lead Electrocardiogram

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John L. Sapp, Meir Bar-Tal, Adam J. Howes, Jonathan E. Toma, Ahmed El-Damaty, James W. Warren, Paul J. MacInnis, Shijie Zhou, B. Milan Horáček

Identification of ventricular tachycardia exit sites may assist substrate-based ablation of ventricular tachycardia. The authors have developed rapid computational methods, based on generic and/or patient-specific heart geometries, for automatically localizing the origin of ventricular activation from 12-lead electrocardiographic QRS integrals, using template matching and continuous localization by multiple linear regression with either a generic or patient-specific geometry. Template matching identified the probable anatomic segment of activation origin; population-based continuous localization provided an estimate of the site of origin (mean error 12 ± 8 mm); patient-specific continuous localization, requiring pacing at 5 to 10 sites, reduced the localization error to <5 mm.

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■ EDITORIAL COMMENT

Computer-Assisted Mapping in Electrophysiology: Are the Machines Taking Over?

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Frank Bogun, Mohammed Saeed

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