Electrocardiographic findings in correlation to cardiac magnetic resonance imaging patterns for isolated ventricular non-compaction patients

Non-compaction cardiomyopathy is a rare congenital cardiomyopathy that affects both children and adults (1). It results from the failure of myocardial development during embryogenesis (2). Isolated ventricular non-compaction is a morphological abnormality of excessive trabeculation and deep inter-trabecular spaces communicating with the ventricular cavity, with the typical bilaminar structure of compacted and non-compacted segment of the ventricle (3). Engberding et al. (4) first described this isolated myocardial anomaly and termed it as persistence of isolated myocardial sinusoids. Chin et al. (5) suggested renaming it "isolated left ventricular non-compaction (IVNC)" as the resultant deep recesses communicate only with the ventricular cavity, not the coronary circulation. The American Heart Association recognized the rapid evolution of molecular genetics in cardiology and classified IVNC as primary, genetic cardiomyopathy. Few studies described and investigated the correlations between arrhythmias and echocardiographic findings in patients with IVNC (6, 7).

The paper published by Akhbour et al. (8) in this issue of the Anatol J Cardiol entitled "Electrocardiographic findings in correlation to magnetic resonance imaging patterns in African patients with isolated ventricular non-compaction," is of interest in describing the electrocardiogram (ECG) findings in African patients diagnosed with IVNC by cardiac magnetic resonance imaging (CMRI) and correlated these patterns with the clinical presentation and mainly with CMR imaging findings. The authors retrospectively reviewed and included 24 patients in this study. The study population underwent 12-lead ECG, 24-h Holter ECG monitoring, echocardiography, and CMR imaging. MRI was performed on patients and images were obtained. Gadolinium was intravenously injected and delayed MRI was performed and late gadolinium enhancement was acquired for cine images. Petersen et al. (9) proposed CMR diagnostic criteria for IVNC patients and the same was followed in the present study. Segmental analysis was assessed using the 17-segment cardiac model, as defined by the American Heart Association/American College of Cardiology statement for standardized myocardial segmentation (10). Left ventricular ejection fraction (LVEF) was measured and the authors considered LVEF <50% as left ventricular systolic dysfunction.

Among 24 patients in this study, 12.5% had hypertension, 16.7% was diabetic, and 4.2% had obesity. Most patients (95.5%) in this study were symptomatic. The symptom was dyspnea in 45.8%, followed by palpitation (33.3%), syncope (8.3%), and chest pain (4.2%), and the average time delay from the first symptom to diagnosis was 23.1 months. ECG analysis revealed that only 2 patients (8.3%) had normal ECG, 12 patients (50%) had intraventricular conduction delay, 1 patient had syncopal complete sino-atrial block, 2 patients had left bundle branch block (LBBB), and 1 patient had Wolf-Parkinson-White syndrome.

In this study, the apical level of the lateral wall was more commonly affected by the non-compaction (100%) and mid-ventricular level of later wall (95.8%). Right ventricular non-compaction was noted in 7 (29.1%) patients. The mean number of left ventricle non-compacted segments per patient was 9.29±3.78 and the mean non-compacted/compacted myocardium ratio was 2.91±0.67, with a maximum of 4.5. Akhbour et al. (8) found no correlation between arrhythmia and the non-compaction site. LBBB was frequently associated with left ventricle lateral wall non-compaction, especially with basal and mid-ventricular wall involvement (p=0.028). No correlation was found between the presence of myocardial fibrosis and systolic dysfunction (Table 2 of the article). The diagnosis of IVNC, ECG, and CMRI findings has been shown (Table 3 of the article). This study assessed the ECG characteristics in patients with IVNC and correlated those with CMR imaging and several main and new findings were documented. Akhbour et al. (8) had described a new method with regard to the ECG findings in correlation with CMR imaging patterns for IVNC patients. It seems obvious that more research is needed, including a much larger, prospective, and electrophysiological study of this mysterious disease.

Sivaraman Jayaraman
Department of Instrumentation and Control Engineering, National Institute of Technology; Tiruchirappalli-*India*

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Address for Correspondence: Dr. Sivaraman Jayaraman M.E., Ph.D., Department of Instrumentation and Control Engineering
National Institute of Technology, Tiruchirappalli 620015-*India*
Phone: 0 431 250 33 89 Fax: 91-431-250 01 33 E-mail: mountshiva@gmail.com
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