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Utility of a prominent R wave in lead V1 of a resting electrocardiogram for detecting significant cardiac pathology in an unselected population of young males

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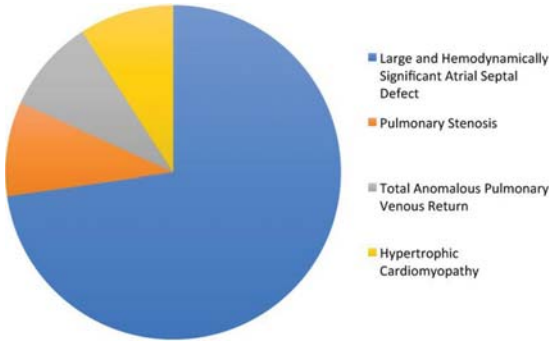
Background: Pre-participation electrocardiogram (ECG) screening is proposed as a means to detect cardiac pathology in asymptomatic individuals, and to select individuals for further cardiac investigation. Isolated ECG finding of Right Ventricular Hypertrophy (RVH) does not require further investigation based on the recent 2017 International Criteria. However, a prominent R wave in V1 has been described in cardiac abnormalities such as Wolff-Parkinson-White syndrome, hypertrophic cardiomyopathy, cardiomyopathy in Duchenne muscular dystrophy, arrhythmogenic right ventricular cardiomyopathy (ARVC), atrial septal defect and pulmonary hypertension.
Purpose: We sought to examine the utility of a prominent R wave in V1 as a screening criterion in an asymptomatic young male population of predominantly non-athletes, to detect significant structural cardiac pathology.
Methods: As part of the Singapore Armed Forces Electrocardiographic and Echocardiographic (SAFE) Protocol Study, pre-military enlistment screening ECG data was collected from 144,346 males between the ages of 16 to 22 from November 2009 to December 2014. Patients with ECGs with a prominent R wave, defined as an R wave $\geq$0.5mV in lead V1 with an R/S ratio of $\geq$1, were sent to a tertiary medical facility for a detailed transthoracic echocardiogram and subsequent cardiologist review. Any cardiac pathology identified was deemed significant if it led to the patient being excluded from participation in vigorous physical activity.
Results: 1,144 patients with an isolated prominent R wave in V1 were studied. The mean age was 18.2±1.09 years and 81% were of Chinese ethnicity. None of the patients had echocardiographic evidence of RVH, 5 patients had a dilated right ventricle and 3 individuals had an elevated pulmonary artery systolic pressure. 11 patients (0.96%) had significant structural heart disease known to be associated with a prominent R wave in V1 that excluded them from participation in physical activity. These included large atrial septal defects (n=8), pulmonary stenosis (n=1), total anomalous pulmonary venous return (n=1) and hypertrophic cardiomyopathy (n=1). The test has a sensitivity of 21.6%, specificity of 93.4%, positive predictive value of 0.96% and negative predictive value of 99.8%,
Conclusion: A prominent R in V1 is not associated with echocardiographic RVH, or ARVC even in a large predominantly non-athletic male population. However, 0.96% of such patients would have other significant cardiac pathologies such as a large atrial septal defect.

Performance As Screening Criteria

Number of Patients With Cardiac Pathology In Those Tested Positive	Number of Patients With Cardiac Pathology In Those Tested Negative	Positive Predictive Value (%)	Negative Predictive Value (%)	Sensitivity (%)	Specificity (%)
11	40	0.96	99.8	21.6	93.4



Significant Cardiac Pathology Identified