The role of right sided Electrocardiography in the diagnosis of Ischemic heart disease.

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Abstract

The use of right sided ECG leads in stable patients with normal ECG had been less well studied and the picture appears hazy regarding its use.The aim is to assess the role of right sided V4 in the investigation of myocardial ischemia. This is a cross sectional study extended over the period of five years from the first of January 2005 to the first of January 2010 and involve 5633 patients.The Sensitivity of the right V4 lead for detection of ischemia was =0.14%. The specificity of the right V4 lead for detection of ischemia was =99.95%. The present study show that V4R has extremely low sensitivity for detection of ischemia in stable patients with ischemic heart disease who had normal resting 12leads ECG, but it has a very high specificity for detection of ischemia.

Introduction

The ECG the most commonly performed, as well as the oldest, cardiovascular laboratory procedure(1).Conventional 12-lead electrocardiography (ECG) is the most widely used method to analyze ECG changes in the diagnosis of acute myocardial infarction (MI). Anterior MI due to occlusion of the left anterior descending coronary artery is diagnosed with high certainty with this method (sensitivity 90%, specificity 95%), whereas diagnosis of MI due to occlusion of the right coronary artery or the circumflex coronary artery is less certain (sensitivity 53%, specificity 98%)(2).

Right sided ECG leads are now an essential diagnostic tools in patients presented with acute myocardial infarction. The American College of Cardiology/American Heart Association published an official practice guideline recommending to add lead V4R if Inferior MI is present (3).

The use of right sided ECG leads in stable patients with normal ECG had been less well studied and the picture appears hazy regarding its use.

The most common QRS configuration in right-sided precordial leads is the rS pattern. The Q waves were present in lead V4R in 4.6% of the study population. ST elevations of 0.5-1 mm were present in 6.2% of V4R recordings. T waves were usually negative in the right-sided precordial leads. However, if there was a STE in V4R, the associated T waves were usually positive, (4).

The aim of the study is to assess the role of right sided V4 in the investigation of myocardial ischemia in stable patients with normal ECG.

Patients & methods

This is a cross sectional study extended over the period of five years from the first of January 2005 to the first of January 2010 and involve 5633 patients.

All patients take ECG for the investigation of chest pain, dyspnea or other angina equivalents were included in the study. Patients taken ECG for other complains such as palpitations and preoperative assessments were exclude. Patients with abnormal ECG were also excluded from the study, i.e. we exclude patients with bundle branch block, Q wave, ST elevation, ST depression, and T inversions, Patients with a pacemaker, preexcitation, and left ventricular hypertrophy .

The right V4 leads were recorded at the right V4 position (5th intercostal space in the right mid-clavicular line).

The presence of more than 0.5 mm elevation of ST segment, or Q wave in the right V4 was regarded as indicative of ischemia. The presence of ischemia in all patients were confirmed or exclude by echocardiography, and/or exercise ECG, and/or cardiac coronary angiography.

Results

The study finally include 5633 patients, of which 3476 were proven to have ischemic heart disease.

Regarding those patients with ischemic heart disease,(3476) only five patients had positive finding in the right V4 lead(0.144%). Regarding patients in whom the diagnosis of ischemic heart disease were exclude(2157), only one patients had a positive finding in the right V4 (0.046%).

The Sensitivity of the right V4 lead for detection of ischemia was =0.14%.

The Specificity of the right V4 lead for detection of ischemia was =99.95%.

The Positive predictive value of the right V4 lead for detection of ischemia was =83%.

The Negative predictive value of the right V4 lead for detection of ischemia was =38%.

Discussion

In the 1970's, Erhardt et al. first showed a right precordial lead V4R was of value in the diagnosis of right ventricular infarct [5]. Since the early 80's, a number of researchers published studies based on relatively small numbers of study subjects.

However, the conclusions of that studies and the more recent studies in the 90's is that the right precordial leads are most useful in detection of RV ischemia or infarct only if an inferior/inferoposterior MI is present (6-13).

Right ventricular infarction rarely occurs in isolation but often occurs with inferior MI .

The present study show that V4R has extremely low sensitivity for detection of ischemia in stable patients with ischemic heart disease who had normal resting 12 leads ECG, but it has a very high specificity for detection of ischemia . The addition of RV4 to the standard 12leads ECG will offer no extra-advantages, and will add to the cost, and consume time for the busy daily practice. Although the right sided leads seems to offer extra advantage in patients with acute coronary syndrome, especially if inferior or inferoposterior MI is present, their role in stable outpatients with normal 12 leads ECG is limited; but if right sided ECG was performed and it was positive, this should be taken

seriously as this has a very high specificity for ischemic heart disease.

The normal12 leads ECG has a low sensitivity for detection of IHD, and a normal resting ECG is quit compatible with severe ischemia. The diagnosis of IHD should never be rejected based on normal resting ECG.

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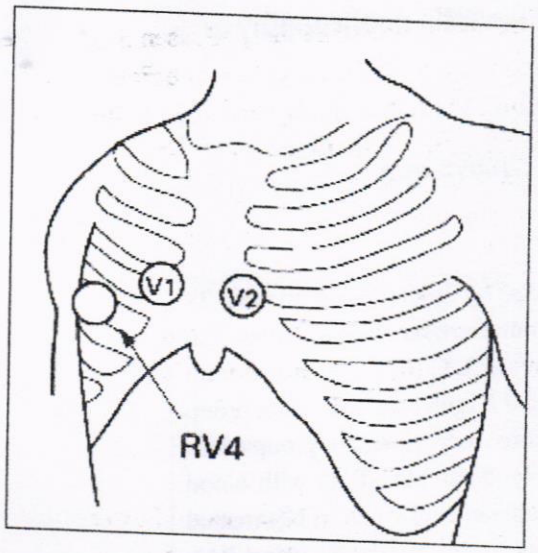

Figure 1 the position of chest leads and RV4

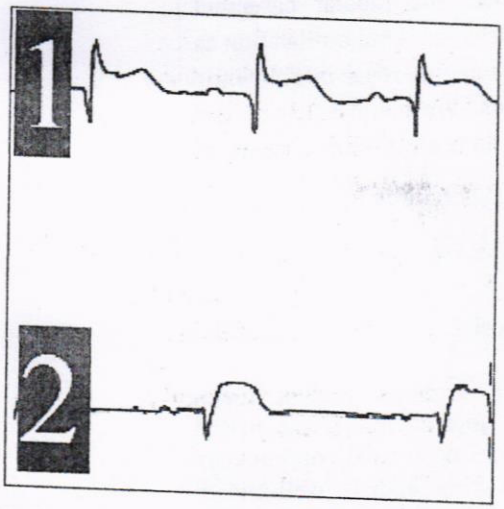

Figure 2 RV4 showing (1) Q wave and ST elevation(2) ST elevation only