

EVALUATION OF CARDIAC SYSTOLIC FUNCTION IN PATIENTS WITH CHRONIC STABLE ANGINA AND NORMAL RESTING ELECTROCARDIOGRAM

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Abstract

BACKGROUND: Chronic stable angina is a common disease afflicting millions of people worldwide. The purpose of this study was to assess whether normal electrocardiogram (ECG) in this group of patients would mean normal cardiac systolic function.

METHODS: Ejection fraction was determined by cardiac angiography in 389 consecutive patients with chronic stable angina who had normal resting ECG. Data was analyzed using t-test in SPSS 10.5.

RESULTS: Only 15 patients (3.9%) with chronic stable angina and normal resting ECG had impaired cardiac systolic function (low ejection fraction).

CONCLUSION: Although a normal ECG by no means exclude possibility of coronary artery disease in patients with symptoms consistent with chronic stable angina, it makes the presence of left ventricular systolic function less likely and might predict a better prognosis.

Keywords: cardiac systolic function, stable angina, electrocardiogram.

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Introduction

Chronic stable angina is a kind of discomfort in the chest or adjacent areas caused by myocardial ischemia; it is usually triggered by exertion and is associated with a disturbance in myocardial function without myocardial necrosis. It is estimated that 6,500,000 Americans have angina pectoris with economic cost of about 73 billion. Heberden's initial description of angina as conveying a sense of strangling and anxiety is still remarkably pertinent. The typical episode of angina pectoris usually begins gradually and reaches its maximum intensity over a period of minutes before dissipating. In some patients the quality of sensation is vague and described as a mild pressure-like discomfort, an uncomfortable numb sensation or a burning sensation.¹

The resting ECG is normal in approximately half of the patients with chronic stable angina.^{1,2} In patients with known coronary artery disease (CAD), the occurrence of Q waves or ST-T seg-

ment abnormalities on the resting ECG may correlate with the severity of the underlying heart disease and hence long-term prognosis.^{1,2}

Several reports have linked these abnormalities on resting ECG with the presence of left ventricular (LV) systolic dysfunction, using some of them as a scoring system to predict left ventricular ejection fraction (LVEF).³⁻⁷ Overall it seems that a negative correlation between ECG score and LV systolic function exist, but the strength of this correlation is different in various studies. There is a wide range of LVEF in patients with the same ECG score and ECG score cannot reliably predict LVEF.

If it is assumed that angina pectoris is not associated with myocardial necrosis, which negatively influence resting ECG, then normal ECG in these patients simply means a chronically ischemic heart which have not undergone necrosis and hence the systolic function has been preserved. Then we can guess normality of LV systolic function on the basis

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of a normal resting electrocardiogram.^{3,8-10} The purpose of this study was to evaluate cardiac systolic function in patients with chronic stable angina and normal resting electrocardiograms.

Materials and Methods

This study was a cross sectional one performed at the years 1382-1383. All 389 patients with a typical history of chronic stable angina and normal resting electrocardiograms which were referred for coronary angiography to Imam Khomeini Hospital were enrolled in the study. Demographic data and risk factors of coronary artery disease of patients were obtained at the time of history taking and during

the review of patients' medical records. LVEF was determined visually by reviewing ventriculograms in angiography films. Data were expressed as mean± standard deviation, t-test was used to test hypothesis, and significance level was considered as $P<0.05$. Statistical analysis was done by SPSS 10.5.

Results

Patients' basic characteristics are depicted in table 1. 374 out of 389 patients (96.1%) had normal LV systolic function (LVEF \geq 50%), while 15 patients (3.9%) had LV systolic dysfunction (LVEF $<$ 50%) ($P<0.05$) (Table 2).

Table 1: Baseline characteristics of the patients.

Age	56.1±9.5 (mean±SD)
Gender (F/M)	
Risk Factors	
Smoking	112 (28.8%)
Diabetes mellitus	70 (18%)
Hypertension	149 (38.3%)
Dyslipidemia	167 (42.9%)
Family history of premature CAD	49 (12.6%)

Table 2: LV systolic function of the patients.

LV systolic function	Frequency (%)	P-Value
LVEF \geq 50%	374 (96.1%)	
LVEF $<$ 50%	15 (3.9%)	0.012

Discussion

Physicians are willing to know LV systolic function when encountering patients with chronic stable angina, because patients with normal LV systolic function, despite morbidity of chronic angina, have a much better long-term survival prognosis. LV systolic function is often determined by echocardiography and more precisely at the time of LV injection in coronary angiography.

Our purpose in this study was to use resting surface ECG as an easy, low cost, and widely accessible method to estimate LVEF. The results of previous studies relating ECG scores to LV systolic function, although consistent in demonstrating a negative correlation, was contradictory in that the magnitude of this correlation was not uniform. Also there was a wide range of LVEF in patients

with the same ECG score, so it seems that ECG score cannot reliably predict LVEF.

In dealing with this challenge and in hope of finding a more consistent result we restrict our patients in this study to those with normal ECG and attempt to find out whether in patients with chronic stable angina, a normal ECG means normal LVEF.

Our findings were similar to others in that when encountering a normal ECG in a patient with chronic stable angina, LV function is probably (although not always) good (3, 8-10). Other reports showed the presence of severe LV systolic function (EF $<$ 25%) in this group of patients to be even rare. Although it is very unusual to have a normal ECG in the presence of severe LV systolic dysfunction (9).

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