Incidence of mortality in 1,040 patients with coronary heart disease or hypertensive heart disease with normal and abnormal left ventricular ejection fraction and with normal and abnormal QRS duration

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Abstract

Introduction: The QRS duration on the resting ECG and LVEF determined by 2-dimensional echocardiography were measured in 1,040 patients with coronary heart disease or hypertensive heart disease with left ventricular hypertrophy (LVH).
Material and methods: A QRS duration of ≥120 msec was considered abnormal. A LVEF <50% was considered abnormal. The 1,040 patients included 627 men and 413 women, mean age 66±15 years. All-cause-mortality was determined at follow-up.
Results: Mean follow-up was 17±10 months. Death occurred in 65 (11%) of 598 patients with a normal QRS duration and a normal LVEF[1], in 19 (19%) of 100 patients with an abnormal QRS duration and a normal LVEF[2], in 53 of 242 (22%) patients with a normal QRS duration and an abnormal LVEF[3], and in 36 (36%) of 100 patients with an abnormal QRS duration and an abnormal LVEF[4] ($P<0.025$ comparing 1 with 2, $P<0.001$ comparing 1 with 3 and 1 with 4, $P<0.01$ comparing 2 with 4 and 3 with 4).
Conclusions: Patients with coronary heart disease or hypertensive heart disease with LVH and an abnormal LVEF and an abnormal QRS duration had a significant 3.3 times higher mortality than patients with coronary heart disease or hypertensive heart disease with LVH and a normal LVEF and a normal QRS duration.

Key words: coronary heart disease, QRS duration, left ventricular ejection fraction.

Introduction

Numerous studies have demonstrated that an abnormal left ventricular ejection fraction (LVEF) is a powerful predictor of mortality [1-5]. Some studies have shown that a QRS duration of ≥120 msec measured from a resting electrocardiogram was associated with increased mortality in postinfarction patients [6], in patients with congestive heart failure [7], and in patients undergoing risk stratification for ventricular arrhythmias [8].

This paper reports the incidence of mortality at 17-month follow-up in 598 patients with coronary heart disease or hypertensive heart disease with left ventricular hypertrophy (LVH) with a normal LVEF and a normal QRS duration, in 100 patients with coronary heart disease or hypertensive heart disease with LVH with a normal LVEF and an abnormal QRS duration, in 242 patients with coronary heart disease or hypertensive heart disease

with LVH with an abnormal LVEF and a normal QRS duration, and in 100 patients with coronary heart disease or hypertensive heart disease with LVH with an abnormal LVEF and an abnormal QRS duration.

Material and methods

In a retrospective study, the patients included 1,040 consecutive patients with coronary heart disease or hypertensive heart disease with LVH who had a measurement of LVEF from a 2-dimensional echocardiogram interpreted by an experienced echocardiographer and a resting electrocardiogram with the QRS duration measured carefully by the investigators in this study. The QRS duration was measured without knowledge by the investigators of the LVEF. Measurements of LVEF and of QRS duration were performed before follow-up for mortality was performed. A LVEF <50% was considered abnormal [1]. A QRS duration ≥120 msec was considered abnormal [6-8]. LVH was diagnosed by 2-dimensional echocardiography if the left ventricular mass index was >134 g/m^2 in men and >110 g/m^2 in women [9].

The patients included 627 men and 413 women, mean age 66±15 years. Mean follow-up for all-cause mortality was 17±10 months.

There was no significant differences in drug therapy or co-morbidities between the different groups.

Student's t-tests were used to analyze continuous variables. Chi-square tests were used to analyze dichotomous variables.

This study was approved by the New York Medical College Institutional Review Board and by the Institutional Review Board of Westchester Medical Center.

Results

Table I shows at 17-month follow-up the incidence of mortality in 598 patients with a normal LVEF and a normal QRS duration, in 100 patients with a normal LVEF and an abnormal QRS duration, in 242 patients with an abnormal LVEF and a normal QRS duration, and in 100 patients with an abnormal LVEF and an abnormal QRS duration. Table I also shows levels of statistical significance. Subgroup analysis showed no significant difference in mortality between the patients with coronary heart disease or hypertensive heart disease with LVH. The results were similar for both coronary heart disease and hypertensive heart disease with LVH. The 2 groups were combined for greater power for statistical analysis.

Discussion

Numerous studies have demonstrated that an abnormal left ventricular ejection fraction (LVEF) is a powerful predictor of mortality [1-5]. In 540 men and women with congestive heart failure after prior myocardial infarction, an abnormal LVEF (<50%) was the most powerful significant independent risk factor for mortality with a risk ratio of 2.154 (95% CI, 1.801, 2.575) [1].

A QRS duration ≥120 msec on the resting electrocardiogram was associated with increased mortality in 1, 455 postinfarction patients [hazard ratio (HR) =4.0] [6], in 669 patients with congestive heart failure [risk ratio (RR) =1.46] [7], and in 915 patients undergoing risk stratification for ventricular arrhythmias (HR =2.1) [8].

The present study showed that the incidence of all-cause mortality at 17-month follow-up in 1,040 patients with coronary heart disease or hypertensive heart disease with LVH was 11% in 598 patients with a normal LVEF and a normal QRS duration, 19% in 100 patients with a normal LVEF and an abnormal QRS duration, 22% in 242 patients with an abnormal LVEF and a normal QRS duration, and 36% in 100 patients with an abnormal LVEF and an abnormal QRS duration. Patients with coronary heart disease or hypertensive heart disease with LVH and an abnormal LVEF and an abnormal QRS duration had a significant 3.3 times higher mortality than patients with coronary heart disease or hypertensive heart disease with LVH and a normal LVEF and a normal QRS duration.

In conclusion, patients with coronary heart disease or hypertensive heart disease with LVH are at increased risk for all-cause mortality if they have an abnormal LVEF or an abnormal QRS duration, and especially both. There was no significant difference between these 2 subgroups. Patients with coronary heart disease or hypertensive heart disease with LVH with an abnormal LVEF or an

Table I. Incidence of mortality at 17-months follow-up in patients with normal left ventricular ejection fraction and QRS duration, in patients with normal ejection fraction and abnormal QRS duration, in patients with abnormal ejection fraction and normal QRS duration, and in patients with abnormal ejection fraction and QRS duration

Variable	Mortality no. [%]
Normal ejection fraction and normal QRS interval[1] (n=598)	65 (11%)
Normal ejection fraction and abnormal QRS interval[2] (n=100)	19 (19%)
Abnormal ejection fraction and normal QRS interval[3] (n=242)	53 (22%)
Abnormal ejection fraction and abnormal QRS interval[4] (n=100)	36 (36%)

P<0.025 comparing 1 with 2, P<0.001 comparing 1 with 3 and 1 with 4, P<0.01 comparing 2 with 4 and 3 with 4

abnormal QRS duration should especially be treated aggressively with intensive medical management to try to reduce this increased mortality.

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