Relationship Between ECG-pattern of Depolarization Abnormalities and an Mildly Reduced Ejection Fraction

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Abstract

The aim of the study was to investigate the relationship between a left ventricular ejection fraction (EF) and ECG patterns associated with structural changes of the myocardium (pathological Q wave, fragmentated QRS complex (fQRS), early repolarization pattern (ERP). The study included 148. According to the level of EF, patients were divided into three groups: Group 1 - patients with low EF (lEF) (less than 40%), group 2 - patients with mildly reduced EF (mrEF) (40-49%); group 3 - patients with preserved EF (pEF) (more than 50%). In the 1st group (EF) fQRS was registered in 16 (51.6%) patients, in the mrEF - in 16 (18.2%). Pathological Q wave was detected in lEF in 20 (65%), in mrEF in 10 (35%), 15 (18%), in pEF in 15 (18%). The fQRS has been found to be more important in identifying patients with mrEF. In lEF in 2 (6.5%) patients, in mrEF - in 2 (6.9%), in pEF - in 11 (12.5%). There was no relationship between ERP and EF.

1. Introduction

The greatest difficulty for the early detection of heart failure is to identify patients with a mildly reduced ejection fraction (mrEF). The key examination is echocardiography, however, it is not a screening method, especially in individuals with mrEF. Nevertheless, ECG method is used in almost all patients with suspected cardiovascular disease and as part of a preventive examination. The traditional ECG-patterns associated with a decrease in EF have a low diagnostic value.

2. The aim of study

The aim of study was investigation of ECG-pattern of depolarization abnormalities (fQRS and ERP) in patients with a mrEF.

3. Materials and methods

The study included 148 patients with ischemic and non-ischemic cardiomyopathy. According to the level of EF, patients were divided into three groups: low EF (lEF) (<40%): 31 (25 men, mean age 52.0 +/-15.6); mrEF (49%-40%): 29 (23 men, mean age 54.7 +/- 12.4); preserved EF (pEF) (>50%): 88 (57 men, mean age 58.2 +/-12.0) - control group.

We used the criteria by Das M. et al, 2006 to identify fQRS and the criteria by Macfarlane P.W. et al., 2015 to identify ERP.

4. Results

Results. In the 1st group (lEF), fQRS was registered in 16 (51.6%), in the 2nd group (mrEF) - in 13 (44.8%), in the 3d (pEF) in 2 (13.6%), p<0.001 (fig. 1).

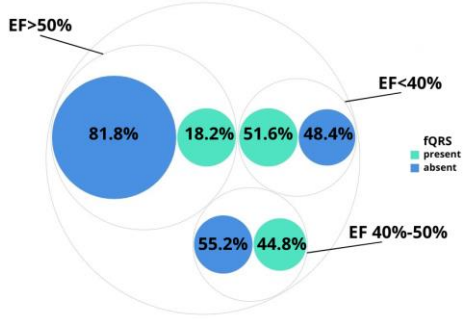

Figure 1. The occurrence of fQRS in the groups under study; EF - ejection fraction, fQRS - fragmented QRS complex.

ERP in the 1st group (lEF) was registered in 2 (6.5%), in the 2nd group (mrEF) – in 2 (6.9%), in the 3d group (pEF) - in 11 (12.5%), p = 0,5. Pathological Q waves were found in 20 patients (65%) of Group 1 (lEF); in 10 patients (35%) of Group 2 (mEF); in 15 patients (18%) of Group 3 (EF over 50%) (fig.2).

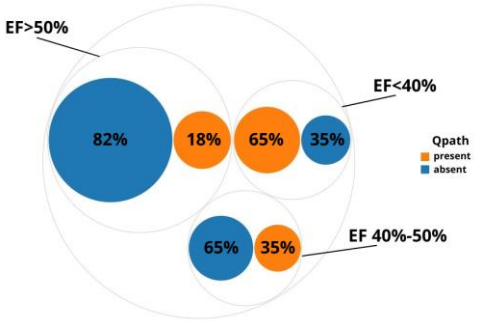

Figure 2. The occurrence of pathological Q wave in the groups under study; Qpath - pathological Q wave. EF - ejection fraction

Values were compared by the $\chi 2$ tests, differences were statistically significant ($p< 0.001$). As a result of the ROC analysis, a relationship was found between fQRS and an mr EF (40-49%) (fig.3).

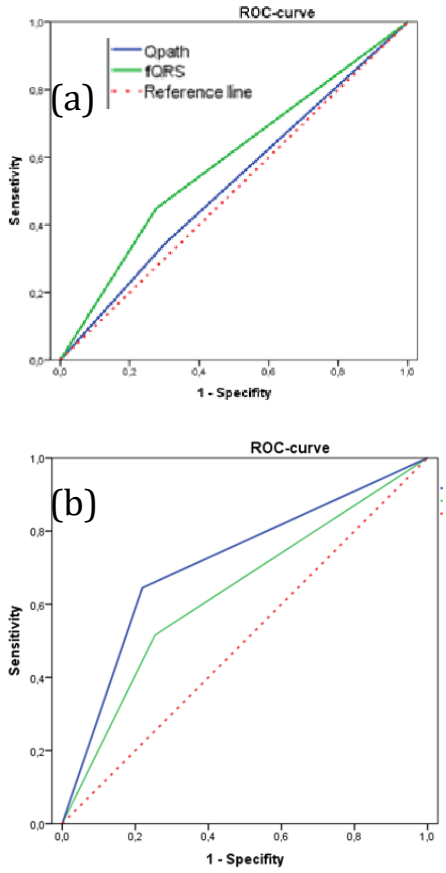

Figure 3. ROC curves for pathological Qwave and fQRS (a) in patients with mildly reduced EF; (b) in patients with lEF. Qpath - pathological Q wave, FQRS - fragmented QRS complex.

4. Conclusions

FQRS has shown its predictive value in identifying patients with mrEF. This ECG-pattern must be analyzed to assess the risk of mrEF.

4. Funding

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