Does a normal electrocardiogram exclude heart failure with reduced left ventricular ejection fraction?

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Funding Acknowledgement: Type of funding sources: Private hospital(s). Main funding source(s): Department of Cardiovascular research, OUH, Svendborg Hospital

Background: In the ESC guidelines for chronic heart failure an electrocardiogram (ECG) is part of the diagnostic set-up (1). A normal ECG makes the diagnosis unlikely. But can a normal ECG exclude heart failure with reduced left ventricular ejection fraction (HFrEF) and be a gatekeeper to echocardiography?

Methods: Patients referred from primary care to the cardiac outpatient clinic with suspicion of heart failure were consecutively included in the study, during a period of one year. With the referral from primary care was included an ECG which was assessed by a senior cardiologist and divided into two groups: 1) Patients with normal ECG; 2) Patients with pathologically ECG. Subsequently, an echocardiographic examination was performed in a blinded fashion and left ventricular ejection fraction (LVEF) was measured.

Results: Overall, 403 patients were included in the study. A normal ECG was present in 155 (38%) patients and a pathological ECG was present in 248 (62%) patients. In total, an echocardiographic examination identified 55 (14%) patients with an LVEF below 60% and 33 patients (8%) with LVEF below 50%. In patients with a normal ECG, only two patients had heart failure with a mildly reduced ejection fraction (41–49%), Figure 1. Thus, the ECG had a sensitivity of 94% and a negative predictive value of 99%, Figure 2.

Conclusion: A normal electrocardiogram has a high diagnostic sensitivity and negative predictive value for excluding heart failure with reduced LVEF and could be a gatekeeping tool in the prioritization of patients referred to echocardiography examination from primary care.