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Can impedance cardiography replace echocardiography in assessment of left ventricular function in patients with heart failure?

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Background: An early and accurate diagnosis of chronic heart failure is a big challenge for a general practitioner. Assessment of left ventricular function is essential for the diagnosis of heart failure and the prognosis. A gold standard for identifying left ventricular function is echocardiography. Echocardiography requires input from specialized care and has a limited access in Swedish primary health care. Impedance cardiography (ICG) is a noninvasive and low-cost method of examination. The survey technique is simple and ICG measurement can be performed by a general practitioner. ICG has been suggested for assessment of left ventricular function in patients with heart failure. We aimed to study the association between hemodynamic parameters measured by ICG and the value of ejection fraction (EF) as a determinant of reduced left ventricular systolic function in echocardiography.

Methods: A non-interventional, observational study conducted in the outpatients heart failure unit. Thirty-six patients with the established diagnosis of chronic heart failure were simultaneously examined by echocardiography and ICG. EF in echocardiography was compared with ICG parameters. Kruskal-Wallis test was used to compare variables and show differences between the groups.

Results: We found that three of four ICG parameters which describe the systolic function of the left ventricle: pre-ejection fraction, left ventricular ejection time and systolic time ratio were significantly associated with ejection fraction measured by echocardiography.

Conclusions: The association which we found between EF and ICG parameters was not reported in previous studies. We found no associations between EF and ICG parameters which were suggested previously as the determinants of reduced left ventricular systolic function. Although the knowledge concerning explanation of hemodynamic parameters measured by ICG is not sufficient, the method remains attractive for future studies and application in patients with heart failure in primary health care due to its simplicity.