

# Impedance Cardiography in Heart Failure Patients in the Intensive Care Unit: Its Value in the Detection of Left Ventricular Systolic Dysfunction and Correlation with the Echocardiogram

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## Background

Impedance cardiography (ICG) is a simple noninvasive method capable of determining multiple hemodynamic parameters, which include indices of systolic cardiac function. It has been utilized in the hemodynamic evaluation of patients with congestive heart failure. This study describes and differentiates the ICG findings of heart failure patients with normal and abnormal systolic function, and evaluates the ability of ICG to detect systolic dysfunction in patients with heart failure, as well as its correlation with the echocardiogram.

## Results

Of the 67 patients, 30 had a low EF (<50%) and 37 had a normal EF as described by echocardiogram. For the group with a low EF, the ICG findings revealed a decreased acceleration index and velocity index. For the second group, ICG showed a normal acceleration index and velocity index. When compared with the standard echocardiogram, ICG was 70% sensitive and 73% specific in detecting systolic dysfunction. Correlation studies using the acceleration index against the presence of systolic dysfunction showed moderately high correlation at  $p < 0.01$ .

## Methods

Sixty-seven consecutive adult patients with heart failure and admitted to the intensive care unit were included. Impedance cardiography was done on admission, and a transthoracic echocardiogram was done within 24 hours. The population was grouped into two based on echocardiographic evaluation - (a) normal systolic function with normal ejection fraction, and (b) abnormal systolic function with ejection fraction <50%. ICG parameters of systolic function were then described in the two groups. ICG parameters of systolic function were then compared and correlated with the echocardiographic parameters of systolic function.

## Conclusions

Impedance cardiography is useful in the noninvasive hemodynamic assessment of heart failure patients. Patients with systolic dysfunction demonstrate a low acceleration index and a low velocity index by ICG, while those with normal systolic function show normal values in both parameters. ICG correlates moderately with the echocardiogram in the detection of systolic dysfunction.