

The Clinical Utility of Impedance Cardiography in Diagnosing Congestive Heart Failure in Dyspneic Emergency Department Patients

Jin Han, MD, Christopher Lindsell, DrPH, AI Turov, BS, Alan B. Storrow, MD
University of Cincinnati, Cincinnati, OH

Presented at the 2002 Society of Academic Emergency Medicine Annual Meeting, May 20, 2002.
Abstract Published in Academic Emergency Medicine, May 2002, Vol. 9, No. 5, p. 439-440.

Introduction

To determine if impedance cardiography (ICG) measurements can accurately diagnose congestive heart failure (CHF) in patients presenting to the emergency department (ED) complaining of shortness of breath (SOB).

Methods

Over a 12-month period, 82 patients presenting to the ED complaining of SOB were enrolled in the study. Patients were over 18 years of age and had not receive diuretics preceding enrollment. Measurements of cardiac index (CI), stroke index (SI), left cardiac work index (LCWI), systolic time ratio (STR), and pre-ejection period (PEP) were made using the BioZ.com ICG monitor (CardioDynamics, San Diego, CA). Diagnosis of CHF was by hospital discharge diagnosis, cardiac catheterization, echocardiography or radionuclide imaging within 2 months of the ED visit. Non-parametric tests were used to compare CHF and non-CHF patients. For each measurement, receiver operating characteristic (ROC) curves were developed for the diagnosis of CHF, areas under the curve (AUC) were used for comparisons. Significance was determined at the $P < 0.05$ level.

Results

Mean values for CI, SI, LCWI, STR, and PEP were significantly different between CHF and non-CHF patients (See Table 1). The AUC (95% CI) for CI, SI, STR, LCWI, and PEP were 0.77 (0.55-0.88), 0.70 (0.57-0.82), 0.70 (0.68-0.82), 0.69 (0.58-0.72), 0.67 (0.55-0.79) respectively.

Table 1. Mean (SD) Diagnostic Measurements

	CI	SI	LCWI	STR	PEP
Non-CHF	2.9 (1.0)	32.6 (12.7)	12.3 (37.4)	0.4 (0.2)	112(25.5)
CHF	2.1 (0.7)*	24.4 (10.2)*	3.1 (2.6)*	0.6 (0.2)*	127(29.2)*

* $P < 0.01$, Mann-Whitney U-Test

Conclusion

As measured by impedance cardiography, CI, SI, and PEP were significantly lower in patients with CHF as compared to non-CHF patients. STR and PEP were significantly higher in patients with CHF. Though the ROC curves for all 5 measurements indicated some usefulness in diagnosis of CHF, CI, SI, and STR appear to be the most effective.