

IMPEDANCE PLETHYSMOGRAPHY UTILIZATION IN THE CARDIOVASCULAR INTENSIVE CARE UNIT

INTRODUCTION

Decompensated heart failure is an increasingly common medical condition that is associated with considerable morbidity and mortality. Prompt recognition of vascular congestion in the acute care setting can be vital in early recognition and management of heart failure patients. Impedance Cardiography is a technique that measures changes in electrical conduction through the body over the course of the cardiac cycle to determine stroke volume.

Although some systems based on these techniques have shown good correlation with cardiac output measured via pulmonary artery catheterization, clinical experience is limited. Impedance Cardiography of thoracic fluid content (TFC) may provide a rapid and non-invasive alternative to traditional Swan-Ganz catheterization in the intensive care setting. This study evaluated the relationship of TFC, cardiac index and serum Cr, a well established marker for morbidity and mortality in the ICU.

METHODS

Eighty-nine consecutive patients presenting to a large community hospital were entered into this prospective, observational study. Bioimpedance hemodynamic values including TFC, cardiac index (CI), cardiac output (CO), and systemic vascular resistance (SVR) were collected in series in eighty-nine consecutive patients.

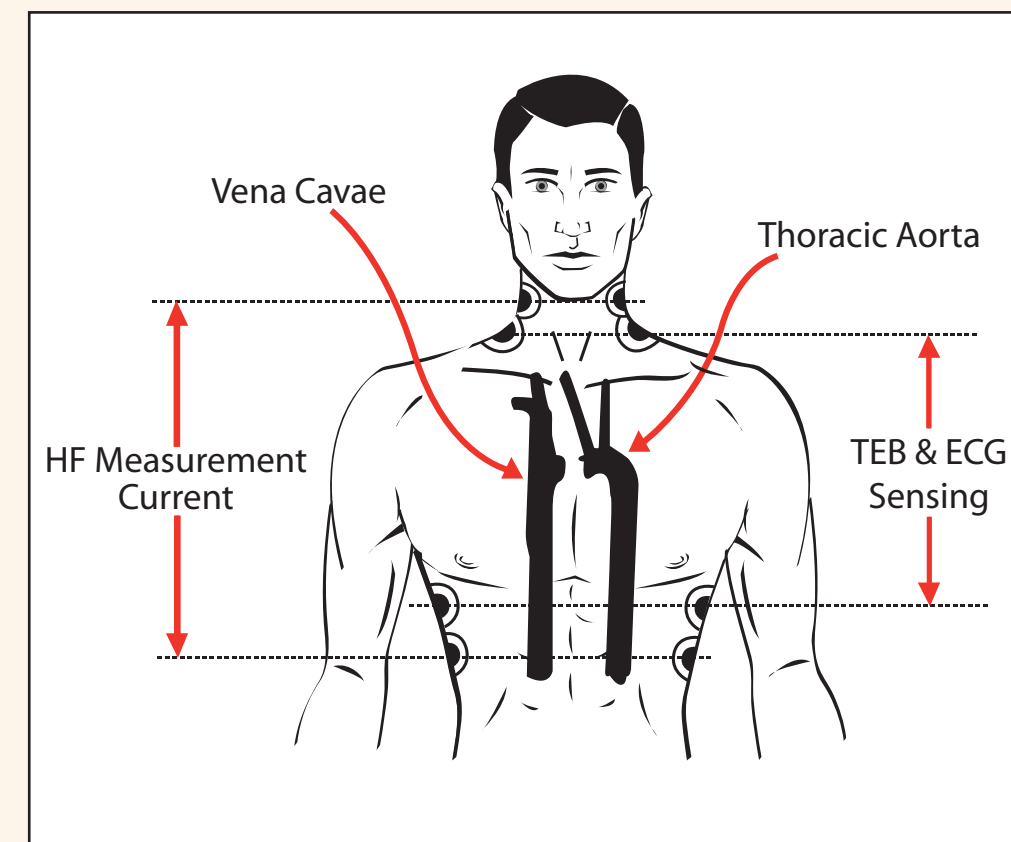
RESULTS

The study yielded significant results utilizing the Pearson correlation, Sig. (2-tailed) method. Creatinine had an inverse correlation with cardiac index (-.213) and a direct correlation with TFC (.227). Furthermore, there is an inverse correlation between BNP and CO (-.447), CI (-.403). There was a correlation between BNP and CO that did not achieve statistical significance.

TABLE 1. PEARSON CORRELATION COEFFICIENTS

Pearson Correlation Coefficients						
Prob > r under H0: Rho=0						
Number of Observations						
	EF	BNP	TFC	BNP	TFC	CR
	1	-0.19597	0.22181	-0.19597	0.22181	-0.04841
EF	55	35	50	35	50	55
		1	0.30733	1	0.30733	0.15382
BNP		43	39	43	39	43
			1	0.30733	1	0.22702
TFC			84	39	84	84
				1	0.30733	0.15382
BNP				43	39	43
					1	0.22702
TFC					84	84
						1
CR						89

FIGURE 1. TRANS-THORACIC CURRENT CONDUCTANCE



CONCLUSION

Non-invasive impedance Plethysmography in the intensive care unit is an additional tool in evaluating vascular congestion in patients presenting with suspected heart failure. It has been shown to have a direct relationship with BNP, and Cr both of which are associated with congestion and increased morbidity and mortality in patients with heart failure. BNP and Cr have also been previously shown to have a direct correlation with severity of disease in heart failure. Additionally there was an inverse relationship with BNP and both CO and CI, demonstrating the relationship between vascular congestion and systolic dysfunction. Thus Impedance Cardiography, a simple, cost-effective, and non-invasive test, can be added to the diagnostic evaluation in patient who has symptoms of heart failure in which the diagnosis is uncertain.

References

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