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| <p style="text-align: center;">Impedance Plethysmography Utilization in Decompensated Heart Failure Bino Oommen, MD</p> |
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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) as a marker for vascular congestion may provide a rapid and non-invasive alternative to traditional monitoring with Swan-Ganz catheterization in intensive care setting. This study evaluates the relationship of TFC, with B-type natriuretic peptide (BNP) and serum creatinine, other markers of vascular congestion and morbidity in the intensive care setting. Additionally the relationship between cardiac output (CO), cardiac index (CI), and BNP was evaluated.

Methods

Eighty-nine consecutive patients that presented to a community hospital were entered into this prospective, observational study. Bioimpedance hemodynamic values including cardiac index (CI), cardiac output (CO), systemic vascular resistance (SVR), and TFC as well as serum Cr and BNP. were obtained on patients within twenty-four hours of admission. Pearson correlation was used to analyze statistically significance between TFC, Cr, and BNP.

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).
(Scatter plot of BNP vs. TFC)

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 with dyspnea whose diagnosis is uncertain.