Impedance Cardiography Informs Hypertensive Management

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Objective
- To consider individualizing standard hypertensive management of CKD subjects using hemodynamic parameters.
- To study if controlled blood pressure (BP) implies normal hemodynamics.

Background
- High BP is a leading cause of death and disability in the US and worldwide.
- Approximately 1 of 3 U.S. adults (75 million) have high BP, and only about half treated with antihypertensive protocol have their high BP in recommended target range.
- Underlying mechanisms of hypertension (HTN) are heterogeneous.
- Titration of medications involves a trial and error process and is typically guided by office or ambulatory BP, an imprecise, indirect fraction of overall hemodynamic status.
- Titration in polytherapy is complex and inefficient.
- Studies have demonstrated improved BP control using impedance cardiography in non-CKD subjects.
- It has been reported that cardiac power index (CPI), the product of mean arterial pressure (MAP) and cardiac index (CI), is the best hemodynamic correlate with mortality.

Methods
Patients: 3 CKD subjects treated by nephrologists at a hypertension clinic.

Results
• #70: 32 yr old African American male, 130 kg, BMI 44.
  • Comorbidities: CKD 3, systolic heart failure secondary to malignant HTN (1/2015).
  • Drug selection: Vasoconstricted HTN typically requires afterload reduction drug class, hyperdynamic HTN typically requires beta blocker drug class, Mix requires both classes. TBW level guides diuretic drug class. In addition, comorbidities including CKD and CHF, are considered when selecting drug classes.

Conclusions
- Knowledge of hemodynamic parameters can improve HTN management
- Blood pressure control alone may not correspond to normalization of hemodynamics, a state shown to be associated with improved mortality in cardiac patients.

Biopendence Cardiography: A regional bioimpedance cardiography device (NiCaS, NI Medical, Israel). Available hemodynamics include: stroke volume (CV), cardiac output (CO), cardiac power (CP), and total peripheral resistance (TPR). All parameters are indexed (I) using body surface area. In addition, body water % (TBW%) is measured.

HTN Category: Vasoconstricted, Hyperdynamic, or Mix (i.e., both).

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