Assessment of Pre-HTN in AF: Role of Non-Invasive Central Blood Pressure Indices Estimation and Technical Challenges

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Introduction: Central blood pressure (CBP) assessment can offer better characterization of pre-HTN by estimating central pulsatile load that is more predictive of new-onset AF. However, non-invasive evaluation of central hemodynamic indices is rarely performed in routine practice.

Methods: To review the current techniques for non-invasive assessment of CBP indices and aortic stiffness, a clinical appraisal of current available techniques used to estimate CBP indices was performed.

Result: None of the available techniques used to estimate CBP are validated in AF. To estimate CBP, the majority of devices acquire central pressure waveforms through peripheral pressure pulse wave recordings. These pressure waveforms are calibrated by brachial blood pressure indices before being subjected to a mathematical algorithm to derive CBP and its indices. The imprecisions in peripheral wave calibration can lead to a mean error of 5 +/- 8mmHg in CBP estimates as listed in Table. In contrast, aortic stiffness assessment, as a surrogate for persistently high central blood pressure, estimated by carotid-femoral pulse wave velocity is more reproducible and strongly associated with adverse cardiovascular and AF outcomes.

Conclusion: Non-invasive CBP assessment devices require improved calibration standards to enhance their clinical utility. Aortic stiffness estimation is clinically more applicable due to its reliability to reflect premature conduit vascular remodeling consequent to an increased central pulsatile load.