high central blood pressure and cardiovascular outcomes

Dr. Aysel ISLAMLI, MD, FESC, FHFA ESC
Baku Health Center
24. 02. 2024
Why is central blood pressure important to be measured?
Why is central blood pressure important to be measured?
$P_1$ – The direct wave pressure amplitude

$P_2$ – The reflected wave pressure amplitude

$A_{IX} = \frac{P_2 - P_1}{PP} \times 100$
wave reflection timing

central BP late wave reflection

central BP early wave reflection
pressure waveform changes

cSBP and cPP are predictive, but not more than pSBP and pPP

https://doi.org/10.1161/HYPERTENSIONAHA.120.14787
why is central blood pressure is important to be measured?

doi: 10.1093/eurheartj/leht565
clinical implications of early wave reflection
differential central to brachial pressure amplification
differential drug effects (CAFE study)

https://doi.org/10.1161/CIRCULATIONAHA.105.595496
“BP-lowering drugs can have substantially different effects on central aortic pressures and hemodynamics despite a similar impact on brachial BP.”
central BP and CV outcomes (Strong Heart Study)

**Figure 1**

Hazard ratios for incident cardiovascular events in 2,405 individuals initially free of clinical cardiovascular disease are stratified by quartiles of brachial (hatched bars) and central aortic (solid bars) PPQs. Quartiles of central PP (p<0.001) predicted outcome more strongly than quartiles of brachial PP (p=0.052). Only the event rate in the fourth central PP quartile (PP ≥50 mmHg) was significantly higher than in the first quartile (p=0.003).

**doi:** 10.1016/j.jacc.2009.05.070
central BP and CV outcomes (Strong Heart Study)

“Noninvasively determined central aortic pressure better predicts incident cardiovascular disease than does brachial pressure.”

doi: 10.1016/j.jacc.2009.05.070
central waveform analysis and HTN management (BP Guide Study)

Figure 1. Overview of study protocol and measures acquired. Arrows indicate the time at which a recommendation letter on antihypertensive treatment titration (maintain, increase, or decrease) was sent to each patient and their attending doctor. ABPM indicates ambulatory BP monitoring; BP, blood pressure; LV, left ventricular; and PWV, pulse wave velocity.
central waveform analysis and HTN management (BP Guide Study)

doi: 10.1161/HYPERTENSIONAHA.113.02001. Epub 2013 Sep 23.
central waveform analysis and HTN management (BP Guide Study)

"... guidance of hypertension management with central BP results in a significantly different therapeutic pathway than conventional cuff BP, with less use of medication to achieve BP control."

doi: 10.1161/HYPERTENSIONAHA.113.02001. Epub 2013 Sep 23.
cardiovascular abnormalities and brain lesions


Association Between Central Blood Pressure and Subclinical Cerebrovascular Disease in Older Adults

Kenji Matsumoto 1, Zhezhen Jin 2, Shunichi Homma 1, Mitchell S V Elkind 3, 4, Tatjana Rundek 5, 6, Carlo Mannina 1, Tetz C Lee 1, Mitsuhiro Yoshita 7, Charles DeCarli 8, Clinton B Wright 9, Ralph L Sacco 5, 6, 10, Marco R Di Tullio 1

Affiliations  + expand

PMID: 31865782  PMCID: PMC7008935  DOI: 10.1161/HYPERTENSIONAHA.119.13478
cardiovascular abnormalities and brain lesions
cardiovascular abnormalities and brain lesions

“White matter hyperintensities have emerged as an important marker of cerebrovascular insult contributing to vascular dementia and to Alzheimer’s disease (possibly as a mixed dementia).

Determining that only central blood pressure assessments were linked with increased white matter hyperintensity burden may have important clinical implications for management of blood pressures among the elderly to promote healthy brain aging.”
clinical use of pulse wave analysis and ways to accurately estimate central aortic pressure by non-invasive pathway

1. Deciding whether to initiate, intensify, or change therapy in younger, asymptomatic individuals with systolic hypertension.

2. Deciding on which class of antihypertensive agent to add when another medication is needed based on the brachial BP.

3. Deciding on whether a change in a previous office encounter has had as desirable effect on central pressure as it may have had on brachial BP.
take home messages

1. Studies document the superiority of central PP and central aortic pressure - over brachial PP in predicting cardiovascular events.

2. From a pathophysiological perspective, central blood pressure correlates better with target organ damage and cardiovascular outcomes than brachial blood pressure.

3. Central pressure more accurately reflects afterload on the left ventricle, cerebral and coronary vascular systems.

4. It is important to test this concept and develop accurate, non-invasive techniques that allow pulse wave analysis and determination of central blood pressure and be widely used in certain situations.