

Inter-arm blood pressure difference and mortality in a general population: the AAA trial

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Introduction

• Difference in blood pressure between arms is associated with increased cardiovascular or all cause mortality in cohorts with established vascular disease or an elevated cardiovascular risk.¹

• The Aspirin for Asymptomatic Atherosclerosis (AAA) trial; an intention-to-treat double blind randomized controlled trial, recruited 3350 men and women aged 50 to 75 years living in central Scotland, free of pre-existing cardiovascular disease, to determine the effectiveness of aspirin 100mg daily vs placebo on primary prevention of cardiovascular events. The primary end point was a composite of initial fatal or nonfatal coronary event or stroke or revascularization.²

• Participants had an elevated cardiovascular event risk, defined by an ankle-brachial pressure index (ABI) ≤ 0.95 and were randomised to receive aspirin or placebo. The ABI measurement protocol included a single brachial blood pressure (BP) measurement in both arms; subjects were followed prospectively for ten years.

Methods

• We undertook a post-hoc analysis of the trial data using the bilateral brachial systolic BPs recorded at recruitment.

• Systolic inter-arm differences were calculated. Based on previous research,³ a cut off of $\geq 10\text{mmHg}$, was examined for survival differences. Survival was explored using Kaplan-Meier analysis. Cox proportional hazard ratios (HRs) were calculated with and without adjustment for confounding variables (age, gender, smoking, diabetes, cholesterol, BP, ABI and deprivation index).

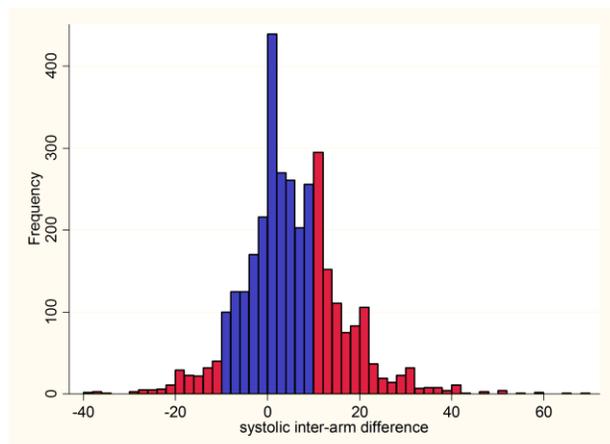


Fig 1. Distribution of systolic inter-arm differences (right minus left) in 3350 subjects

Results

- 1280/3350 participants (32%) had systolic inter-arm differences $\geq 10\text{mmHg}$ (Fig 1).
- Differences $\geq 10\text{mmHg}$ were associated with higher prevalence of peripheral arterial disease, defined as ABI < 0.9 or ≤ 0.85 .

References:

- (1) Clark CE, Taylor RS, Shore AC, Ukoumunne OC, Campbell JL. Association of a difference in systolic blood pressure between arms with vascular disease and mortality: a systematic review and meta-analysis. *Lancet* 2012; 379:905-914.
- (2) Fowkes FG, Price JF, Stewart MCW, Butcher I, Leng GC, Pell ACH et al. Aspirin for Prevention of Cardiovascular Events in a General Population Screened for a Low Ankle Brachial Index: A Randomized Controlled Trial. *JAMA: The Journal of the American Medical Association* 2010; 303(9):841-848.
- (3) Clark CE, Taylor RS, Shore AC, Campbell JL. The difference in blood pressure readings between arms and survival: primary care cohort study. *BMJ* 2012; 344:e1327.

Results (contd)

• Over ten years there were 362 (10.8%) deaths from all causes and 94 (2.8%) cardiovascular-related deaths. An inter-arm difference $\geq 10\text{mmHg}$ was associated with increased cardiovascular deaths (HR 1.6 (1.1 to 2.4), $p=0.019$, Fig 2; adjusted HR 1.5 (1.0 to 2.4)), but not all cause mortality (HR 1.1 (0.9 to 1.4)).

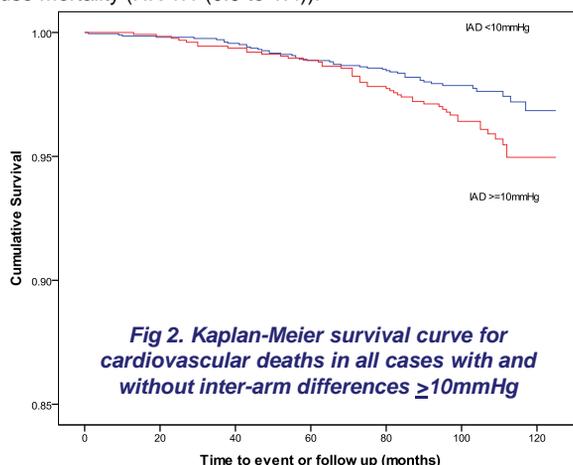


Fig 2. Kaplan-Meier survival curve for cardiovascular deaths in all cases with and without inter-arm differences $\geq 10\text{mmHg}$

• There were 764 (23%) subjects with hypertension. For this group inter-arm difference $\geq 10\text{mmHg}$ was associated with increased all cause mortality (HR 1.6 (1.0 to 2.4), $p=0.031$; adjusted HR unchanged), and increased cardiovascular mortality (HR 2.9 (1.3 to 6.4), $p=0.005$, Fig 3; adjusted HR 3.1 (1.3 to 7.4)).

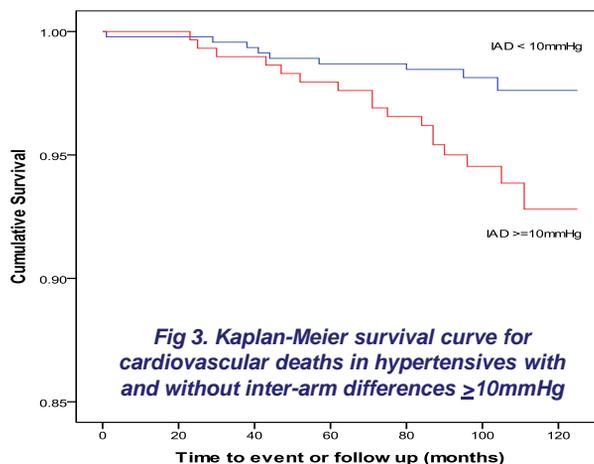


Fig 3. Kaplan-Meier survival curve for cardiovascular deaths in hypertensives with and without inter-arm differences $\geq 10\text{mmHg}$

Conclusions

- In subjects free of cardiovascular disease, preliminary findings indicate that a systolic inter-arm difference $\geq 10\text{mmHg}$:
 - is associated with higher prevalences of peripheral arterial disease
 - is associated with increased cardiovascular mortality
- In hypertensive subjects it is also associated with increased all-cause mortality.