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DELINEATING THE MECHANISMS OF AGE RELATED BLOOD PRESSURE CHANGE

Poster Contributions

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Background: Pulsatile blood pressure rises with age, especially in the aorta. The comparative role of forward and reflected pressure waves (FW and RW respectively), determined by aortic flow triangulation, has not previously been explored in a large clinical cohort. This study aimed to identify the role of FW and RW in the rise in aortic systolic and pulse pressure with age.

Methods: For 1474 outpatients, aortic pressure waveforms were generated using a validated generalized transfer function applied to radial pressure waves recorded using applanation tonometry. FW and RW were subsequently determined using aortic flow triangulation, a recent technique supported by aortic MRI. Contributions of FW and RW to rise in aortic systolic and pulse pressure (PPa) with age were determined using univariate and multivariate linear regression and product of coefficient mediation analysis, with adjustment for height, weight, heart rate and mean arterial pressure. Comparisons were made by gender and before and after age 60.

Results: Both FW and RW contributed to pulsatile aortic pressure with aging. Across the entire lifespan, the correlation between PPa and RW was greater than with FW ($r^2=0.942$ vs $r^2=0.731$, respectively, $p<0.001$). Under age 60, RW raised PPa by 0.394mmHg/year (95%CI 0.315-0.478, $p<0.001$) whereas FW contributed 0.104mmHg/year (95%CI 0.042-0.171, $p<0.001$) [difference between FW and RW, $p<0.05$]. The difference between FW and RW under age 60 was driven by men, where FW was non-contributory. Over age 60, both RW and FW were significant and equal contributors. RW raised PPa by 0.656mmHg/year (95%CI 0.496-0.820, $p<0.001$) whilst FW contributed 0.465mmHg/year (95%CI 0.318-0.623, $p<0.001$) [difference between FW and RW, $p>0.05$, not significant]. These patterns were also seen for aortic systolic pressure and were seen irrespective of multivariate adjustment.

Conclusions: In a clinical setting, both FW and RW are important to pulsatile aortic blood pressure across the lifespan, but RW appears to have a more pronounced effect across all ages, whereas FW has less effect in younger persons, especially men. This has implications for rational antihypertensive use and cardiovascular prevention with aging.