SEX DIFFERENCES IN ARTERIAL HEMODYNAMICS IN PATIENTS WITH DEGENERATIVE THORACIC AORTIC ANEURYSMS

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BACKGROUND: Women with thoracic aortic aneurysms (TAA) experience worse outcomes at smaller aortic sizes when compared to men. Further, we have previously shown that female sex is associated with faster aneurysm growth, which is unique to individuals affected with degenerative forms of TAA (dTAA). Therefore, we sought to evaluate the potential differences in arterial health parameters (arterial stiffness and hemodynamics) that could explain this sex-specific difference in dTAA growth and outcomes.

METHODS AND RESULTS: In a subgroup of individuals with dTAA from a previously published prospective cohort study, we compared aortic stiffness and hemodynamics between sexes. We included 80 participants (33% women) with unoperated dTAA. Aortic stiffness, central blood pressure, and measures of steady and pulsatile arterial load were estimated with validated techniques that combine applanation tonometry with transthoracic echocardiography. Comparison of baseline characteristics between males and females is presented in the Table. Univariable linear regression analyses showed that women had higher aortic characteristic impedance (mean difference [MD] = 37.35 ± 16.07 dyne x s/cm⁻⁵, P = 0.03) and reflected pressure wave amplitude (MD = 4.34 ± 2.05 mmHg, P = 0.04), and lower total arterial compliance (MD = -0.65 ± 0.18 mL/mmHg, P = 0.001) than men. In multivariable linear regression analyses (adjusted for age, body-mass index, hypertension, mean arterial pressure, diabetes, and smoking history), aortic characteristic impedance and reflected pressure wave amplitude remained significantly higher (respectively MD = 17.18 ± 6.36 dyne x s/cm⁻⁵, P = 0.009, and MD = 1.74 ± 0.77 mmHg, P = 0.03), while total arterial compliance (MD = -0.29 ± 0.09 mL/mmHg, P = 0.002) was significantly lower in women compared to men. (Figure)

CONCLUSION: Despite comparable aneurysm sizes and mean arterial pressure, women with dTAA display more severe alterations in pulsatile arterial hemodynamics when compared to men with dTAA, highlighting greater arterial aging in women. Given previously reported sex differences in TAA growth and outcomes, our findings add to the existing literature by highlighting pulsatile arterial hemodynamics as potential tools for risk stratification, disease monitoring and therapeutic targeting in women with dTAA.