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Young Investigator Awards Competition

EFFECTS OF NEPHRECTOMY ON CARDIOVASCULAR STRUCTURE AND FUNCTION IN LIVING KIDNEY DONORS

Oral Contributions
Room 10
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Session Title: Young Investigator Awards Competition: Physiology, Pharmacology, and Pathology
Abstract Category: Physiology, Pharmacology, Pathology
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Background: The mechanisms responsible for increased cardiovascular (CV) mortality in chronic kidney disease (CKD) are unclear. Kidney donors offer a unique opportunity to examine the longitudinal effects of reduced renal function on the CV system. Emerging data suggest excess CV mortality in donors compared with appropriately selected controls. We hypothesised that the reduction in GFR associated with nephrectomy causes increased left ventricular (LV) mass, impaired LV function and increased aortic stiffness.

Methods: This was a multicentre, longitudinal, parallel group, blinded end point study of living kidney donors and healthy controls (n=124). The primary outcome was change in LV mass assessed by MRI (0 to 12 months). Pre-specified secondary outcomes included: LV mass-volume ratio; LV strain indices; brachial and central blood pressure (BP); carotid-femoral pulse wave velocity (PWV); aortic distensibility and CV biomarkers.

Results: Compared to controls, nephrectomy in donors was associated with increases in LV mass ($+7 \pm 10$ g vs. -3 ± 8 g; $P<0.001$); LV mass-volume ratio ($+0.06 \pm 0.12$ g/ml vs. -0.01 ± 0.09 g/ml; $P<0.01$) and PWV ($+0.5 \pm 0.9$ m/s vs. -0.1 ± 0.7 m/s; $P<0.001$); and reductions in aortic distensibility ($-0.29 \pm 1.38 \times 10^{-3}$ mmHg $^{-1}$ vs. $+0.28 \pm 0.79 \times 10^{-3}$ mmHg $^{-1}$; $P=0.03$) and global circumferential strain ($-1.1 \pm 3.8\%$ vs. $+0.4 \pm 2.4\%$; $P=0.04$). The decrease in isotopic GFR (-30 ± 12 ml/min/1.73m 2 vs. -1 ± 10 ml/min/1.73m 2) was accompanied by increased urate ($+0.95 \pm 0.61$ mg/dl vs. $+0.03 \pm 0.54$ mg/dl; $P<0.001$); parathyroid hormone ($+1.1 \pm 1.6$ pg/ml vs. $+0.4 \pm 1.3$ pg/ml; $P=0.03$) and hsCRP ($+1.7 \pm 5.3$ mg/dl vs. -0.7 ± 5.2 mg/dl; $P<0.01$); with greater risks of developing detectable hs-cTnT (21% vs. 2%; OR, 16.2 [95%CI, 2.6 - 100.1]; $P<0.01$) and microalbuminuria (7% vs. 0%; OR, 3.74 [95%CI, 1.09 - 12.75]; $P=0.04$). There were no changes in brachial or central BP. Change in GFR independently predicted the change in LV mass ($R^2=0.26$; $P<0.01$).

Conclusion: Nephrectomy causes concentric LV remodelling and dysfunction, increased aortic stiffness and adverse changes in CV biomarkers. These findings suggest reduced GFR is an independent causative CV risk factor and that donors should be under long-term CV review.