Heart

5.1 Cardiac Natriuretic Peptides Reflect Left Atrial Volume (LAV) and Capture Longitudinal Changes in LAV in End-Stage Renal Disease Patients

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Introduction. Left atrial volume (LAV) has recently emerged as a prognostic factor which can be used for risk stratification and risk monitoring in patients with end-stage renal disease (ESRD). Atrial natriuretic peptide (ANP) and brain natriuretic peptide (BNP) are two biomarkers which reflect atrial and ventricular pressures and left ventricular mass but the relationship of these peptides with LAV are still scarcely characterised.

Aim. To test the relationship between ANP and BNP with LAV and with LAV changes over a follow-up of 17±2 months.

Methods. This longitudinal study was performed in a cohort of 151 ESRD patients (age: 57±12 years; M: 60% and F: 40%). LAV was significantly higher in haemodialysis patients than in healthy subjects ($P<0.001$).

Results. On univariate analysis, both plasma ANP ($r=0.60$, $P<0.001$) and BNP ($r=0.61$, $P<0.001$) were strongly and directly related to baseline LAV and these associations remained substantially unmodified (ANP-LAV link: $\beta=0.44$, $P<0.001$; BNP-LAV link: $\beta=0.45$, $P<0.001$) in hierarchical models including left ventricular mass and function as well as the remaining Framingham risk factors (age, sex, smoking, diabetes, cholesterol and systolic blood pressure), CV complications, risk factors peculiar to ESRD (haemoglobin and calcium phosphate product) and emerging risk factors (CRP and homocysteine). During the follow-up there was a significant increase in LAV (from 10 ± 4 ml/m².7 to 11 ± 5 ml/m².7, $P<0.001$). Changes in LAV (as adjusted for the corresponding baseline value) were directly and significantly related to plasma ANP ($r=0.25$, $P<0.001$) and BNP ($r=0.26$, $P<0.001$) and these associations held true in multiple regression models including the same set of confounders considered above. Furthermore, ROC curve analysis revealed that both ANP and BNP added significant prediction power (+10% and +14%, respectively) to a basic model (i.e. a model including Framingham risk factors, factors peculiar to ESRD and emerging risk factors) for identifying patients with an increase in LAV >3 ml/m².7/year (a threshold that corresponds to the mean + 1 SD of LAV changes in the whole study population). Remarkably, in this analysis the additional predictive power of BNP was identical to that of left ventricular mass and function (+14%).

Conclusions. Cardiac natriuretic peptides are independently related to LAV and predict the worsening in LAV in patients with ESRD. Because an increased LAV underlies diastolic dysfunction and/or volume expansion, i.e. potentially modifiable risk factors, the measurement of the plasma concentration of ANP and BNP might be useful for risk stratification and for guiding treatment in dialysis patients.