KSN 2016 Abstract Submission

Transplantation & Immunology

KSN2016ABS-1220

Control of water balance through antidiuretic hormone and proadrenomedullin in transplanted kidney

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Background: Antidiuretic hormone (ADH) has vasoconstrictive and antidiuretic effects. The most powerful stimuli for ADH release are plasma osmolality and body volume status. However, ADH is inappropriately increased in the majority of dialysis patients despite of normal osmolality and volume overload. On the other hands, researchers revealed that proadrenomedullin (proADM), which has vasodilatative and natriuretic effects, could reflect excessive volume status and cardiac dysfunction in dialysis patients. We assessed mechanism of ADH response during kidney transplantation with proADM as a marker of volume and cardiac dysfunctions.

Methods: As a single center study, five hemodialysis and five peritoneal dialysis patients' plasma ADH and proADM with other parameters were analyzed at four times before and after kidney transplantation (pre-operative, post-operative 48 hours, 120 hours, 168 hours). Pre-operative echocardiography was done in all patients. Mann-Whitney and Wilcoxon signed rank test used as statistical methods.

Results: All patients showed elevated plasma osmolality than normal (309 ± 6.06 mOsm/Kg·H_2O). However, three hemodialysis and two peritoneal dialysis patients' levels of pre-operative ADH was increase two folds more than normal upper limits (34.7 ± 26.1 vs 5.52 ± 2.8 pg/mL), and that group's level of pre-operative proADM was higher than the other group's one (32155 ± 29899 vs 9175.9 ± 8724.1 pmol/L, p = 0.05). ProADM had positive correlation with ADH levels pre-operatively (r = 0.75, p = 0.01) and negative correlation with ratio of diastolic and systolic left ventricular internal diameter (r = -0.64, p = 0.04). ADH and serum osmolality were decreased significantly within post-operative 120hours (p = 0.04, 0.02). However, post-operative proADM did not decreased until post-operative 168hours (p = 0.3).

Conclusion: It seemed like pre-operative ADH response was handle by baroreceptors which related with effective circulating volume and cardiac dysfunctions. However, post-operative ADH response was related to osmoreceptors. Unchanged or even increased post-operative proADM might be related to fluid therapy after transplantation and unrestored cardiac functions. However, Additional large and longtime follow up study are needed for defining the causes of elevated proADM in kidney transplanted patients.

Keywords: antidiuretic hormone, Kidney Transplantation, proadrenomedullin