S-C12

Plasma Neutrophil Gelaninase-associated Lipocalin (NGAL) as a Biomarker for Acute Kidney Injury in Patients with Chronic Kidney Disease

Ha Yeon Kim, Eun Hui Bae, Soo Wan Kim, Seong Kwon Ma

Department of Internal Medicine, Chonnam National University Medical School, Gwangju, Korea

Background: Neutrophil gelatinase-associated lipocalin (NGAL) has been put forward as a novel biomarker for the early prediction of acute kidney injury (AKI). The aim of this study was to evaluate plasma NGAL levels as a predictor of early AKI in patients with with/without chronic kidney disease (CKD) and to assess whether plasma NGAL level could represent a useful marker of recovery in patients undergoing continuous renal replacement therapy (CRRT).
Methods: Study I: This single center retrospective observational study included 343 patients with AKI or CKD. The patients were classified into 3 groups: AKI (N=69), AKI on CKD (N=162), CKD (N=112). The cut-off values of NGAL was 200 ng/ml and those of cystatin-C was 1.0 mg/L. Study II: The retrospective observational study included 404 patients treated with CRRT. The patients were divide into 2 groups: renal recovery (N=120) vs. renal non-recovery (N=284) and survivor (N=193) vs. non-survivor (N=211). Renal recovery was defined as no need for dialysis.
Results: The highest levels of NGAL at baseline were seen in the AKI on CKD group (839.5±400.7 ng/ml). The prevalence of abnormal NGAL values was 69.0% in AKI group, 94.5% in AKI on CKD group and 91.8% in CKD group. At both baseline (Day 1) and follow-up (Day 3), NGAL were positively correlated with eGFR ($r=0.41$, $p<0.001$), and cystatin-C ($r=0.45$, $p=0.021$). The mean values of baseline NGAL were 594.6±448.4 ng/ml in AKI group, 839.5±400.7 ng/ml in AKI on CKD group, 753.4±404.3 ng/ml in CKD group ($p<0.001$). The mean values of follow-up NGAL were 475.9±435.9 ng/ml in AKI group, 773.2±370.6 ng/ml in AKI on CKD group, 709.4±401.6 ng/ml in CKD group ($p<0.001$). In AKI group, the difference of NGAL (baseline NGAL-follow-up NGAL) was the highest (110.8±325.0 ng/ml in AKI group, 35.7±205.2 ng/ml in AKI on CKD group, 14.1±201.3 ng/ml in CKD group, $p<0.001$). In comparisons between renal recovery group and non-recovery group and survivors and non-survivors in CRRT patients, both baseline NGAL and follow-up NGAL were not different, but the difference of NGAL (baseline NGAL-follow-up NGAL) was increased significantly in a renal recovery and survivors group (90.6±82.9 ng/ml in renal recovery group vs. 33.8±53.7 ng/ml in renal non-recovery group, 129.8±182.4 ng/ml in survivor group vs. -98.5±162.6 in non-survivor group, $p<0.001$, respectively). In addition, hourly urine output for the first 3 days was increased in a renal recovery group and survivor group than non-recovery group and non-survivor group ($p<0.001$)
Conclusion: The value of serum NGAL per se has a limitation on diagnosis of AKI in patients with underlying CKD. Follow up of serum NGAL value is helpful to diagnose AKI. In patients treated with CRRT, hourly urine output and follow up of serum NGAL value may predict renal recovery and survival.

Key Words: NGAL, AKI, CRRT