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Preoperative Low Urine pH predicts Acute Kidney Injury after Cardiac Surgery

Min-uk CHA¹, Misol LEE¹, Ki heon NAM¹, Seong yeong AN¹, Jong hyun JHEE¹, Seohyun PARK¹, Hyoungnae KIM¹, Hae-ryong YUN¹, Youn kyung KEE¹, Seung hyeok HAN¹, Tae-hyun YOO¹, Shin-wook KANG^{1,2}, *Jung tak PARK¹

¹Internal Medicine, College of Medicine, Institute of Kidney Disease Research, Yonsei University, Seoul, Korea, Korea, South, ²Internal Medicine, College of Medicine, Severance Biomedical Science Institute, Brain Korea 21 PLUS, Yonsei University, Seoul, Korea, Korea, South

Objectives : Acute kidney injury (AKI) is a common complication after cardiac surgery. Previous studies have shown that renal function decline is aggravated in CKD patients with low urine pH. However, the relationship between urine pH and the development of AKI is not well investigated. In this study, the clinical implication of preoperative urine pH on AKI occurrence after cardiac surgery was evaluated.

Methods : Patients who underwent coronary artery bypass graft or valve surgery at Yonsei University Health System from January 2013 to December 2014 were enrolled. Urinalysis and blood chemistry levels within 96 hours before cardiac surgery were adopted for preoperative values. The patients were divided into 3 groups based on preoperative urine pH levels, which represented group 1 <6.0; group 2 6.0 to 6.5; and group 3 >6.5. The primary outcome was the incidence of AKI within 48 hours after cardiac surgery. AKI was defined according to Acute Kidney Injury Network (AKIN) criteria.

Results : A total of 832 patients were evaluated. The mean age was 60.1 ± 14.7 years, and 492 patients (59.1%) were male. The mean preoperative urine pH level and eGFR were 5.8 ± 0.8 , and $84.0 \pm 23.4 \text{ mL/min/1.73m}^2$, respectively. AKI was observed in 208 patients (25.0%) after cardiac operation. The incidence of AKI was higher in group 1 (29.8%) than in group 2 (18.5%) and group 3 (17.4%) ($P < 0.001$). Multivariate logistic regression showed that low preoperative urine pH was associated with AKI even after adjusting for age, sex, diabetes mellitus, preoperative hemoglobin, serum bicarbonate levels, and eGFR.

Conclusions : Low preoperative urine pH is associated with higher incidence of AKI after cardiac surgery. Evaluating preoperative urine pH may help post cardiac surgery AKI prediction.

Keywords : urine pH, acute kidney injury, cardiac surgery