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# 심장수술 환자에서 수술 전 혈청 중탄산염의 농도가 급성 신손상에 미치는 효과

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정수영, 박정탁, 김형우, 류근우, 이슬아, 박서현, 지종현, 오형중, 한승혁, 유태현, 강신욱

# Impact of Preoperative Low Serum Bicarbonate Level on Acute Kidney Injury after Cardiac Surgery

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**Background:** Metabolic acidosis is known to be a risk factor for renal function deterioration in chronic kidney injury patients. However, it is not well known whether preoperative acid-base disturbance is associated with the development of acute kidney injury (AKI) in patients who undergo cardiac surgery. Therefore, we aimed to identify the clinical implications of preoperative serum bicarbonate levels on AKI occurrence after cardiac surgery.

**Methods:** Patients who underwent coronary artery bypass or valve implantation surgery at Yonsei University Health System from January to December 2014 were enrolled. Serum bicarbonate levels and creatinine concentrations within 96 hours before cardiac surgery were adopted for preoperative values. The patients were categorized into three groups according to preoperative serum bicarbonate levels; group 1 (n=85), ≤22 mEq/L; group 2 (n=114), 23-24 mEq/L; group 3 (n=253), ≥25 mEq/L. Primary outcome was incidence of AKI at 48 hours after cardiac surgery. AKI was defined by the Acute Kidney Injury Network criteria. Multiple logistic regression analysis was performed to find risk factors of AKI occurrence.

**Results:** The mean age was 61.3 years, and 278 (61.5%) patients were male. 94 patients (20.8%) developed AKI at 48 hours after cardiac surgery [stage 1, 71 (75.5%); stage 2, 10 (10.6%); stage 3, 13 (13.8%)]. Incidence of AKI was higher in group 1 (36.5%) than group 2 (21.1%) and group 3 (15.4%) (P<0.001). In multiple logistic regression analysis, AKI was significantly associated with low preoperative serum bicarbonate levels [group 1 vs. group 3, odds ratio=2.431 95% confidence interval=1.329-4.449, P=0.004] after adjusting for sex, hypertension, diabetes mellitus, hemoglobin, and estimated glomerular filtration rate. In addition, the duration of postoperative ICU stay was longer in AKI patients [AKI patients (6.46 days) vs. non-AKI patients (2.78 days), p<0.001] and in the low preoperative serum bicarbonate level groups [group 1 (4.8 days), group 2 (3.5 days), group 3 (3.2 days), P=0.018].

**Conclusion:** Low serum bicarbonate levels were associated with higher incidence of AKI and prolonged ICU stay. Checking serum bicarbonate concentrations before cardiac surgery may be a useful predictor of postoperative AKI development after cardiac surgery.

**Key Words:** 혈청 중탄산염, 급성 신손상, 심장수술
Serum bicarbonate level, Acute kidney injury, Cardiac surgery