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Preoperative creatinine-cystatin C ratio predicts acute kidney injury after cardiac surgery

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Objectives: Acute kidney injury is a common and serious complication following cardiac surgery. However, strategies that effectively predict AKI risk before cardiac surgery are scarce. Muscle mass amount has been reported to be a factor affecting outcome in critically ill patients with AKI. Recently, the ratio between creatinine and cystatin C has been found to represent muscle mass in people without kidney failure. Hypothesizing that muscle mass may be associated with post cardiac surgery AKI risk, Cr/CysC was evaluated as a risk factor for AKI development after cardiac surgery.

Methods: A total of 2,764 patients who underwent coronary artery bypass or valve surgery at Yonsei University Health System from May 2011 to May 2019 were enrolled. Patients who were previously diagnosed ESRD were excluded. The patients were divided into quartiles based on Cr/CysC levels. The primary outcome was occurrence of AKI within 48 hours of cardiac surgery. AKI was defined according to Acute Kidney Injury Network criteria.

Results: The mean age of the patients was 63 years. Diabetes consisted of 30% of the patients and 43% were hypertensive. The mean eGFR before surgery was 87.9mL/min/1.73m2. AKI developed in 878 (31.8%) patients. The AKI incidence was highest in the group with the lowest Cr/CysC level (200, 22.8%), while the incidence was lowest in the highest Cr/CycC level group (263, 30.0%) ($P < 0.001$). Multivariable logistic regression analysis revealed that being included in the lowest Cr/CysC quartile group was significantly related with higher post cardiac surgery AKI incidence risk (odd ratio (OR), 1.98; 95% CI, 1.50-2.62; $P <0.001$). This association was significant even after adjustments were made for confounding factors (OR, 2.04; 95% CI, 1.44-2.89, $P <0.001$).

Conclusions:

Low pre-operative Cr/CysC ratio was associated with increased risk of cardiac surgery associated AKI. Evaluating pre-operative Cr/Cys ratio may be useful in stratifying post cardiac surgery AKI risk.