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Acute kidney injury in cancer patients: risk factors and impact on mortality

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Objectives : Because acute kidney injury (AKI) is highly associated with higher mortality and morbidity, treatment of cancer patients with AKI is a very challenging issue for both oncologists and nephrologists. We investigated the incidence of AKI in cancer patients in Korea, and evaluated the risk factors and clinical outcomes of AKI in cancer patients.

Methods : Study population included all patients who registered Korean Central Cancer Registry (KCCR) for the 1st time in Seoul National University Hospital between January 1, 2004 and December 31, 2013. The patients who were diagnosed double primary cancer, less than 18 years, measured serum creatinine(sCr) only once or did not measure sCr after the KCCR registration date, had estimated glomerular filtration rate(eGFR) <15mL/min/1.73m2 were excluded. Initial sCr was defined as first measured sCr within 2 months before and after the date of KCCR registration, and baseline sCr was defined as minimum value of sCr from the previous 3 weeks by shifting the reference point every 3 weeks based on KCCR registration date. AKI was defined as an absolute increase in sCr more than 0.3mg/dL or 1.5 fold from initial or or baseline sCr. Age, sex, hypertension, diabetes, body mass index, mean arterial pressure, classifications of cancer, eGFR, count of contrast computed tomography(CT), clinical trial, surgery and chemotherapy were included as covariates. Outcome was patients overall survival.

Results : Total 68,036 patients were included and mean follow-up duration was 48.5±40.3 months. Mean age was 56.9±13.0 and 50.6% were male. AKI occurred in 23,024(33.8%) of cancer patients during the follow-up period. Median time to first AKI was 106 days (interquartile range 25-475 days) and more than half of patients (n=11,724, 50.9%) experienced two or more AKI events. Patients who developed AKI after cancer diagnosis had lower baseline eGFR and was experienced more contrast CT examination. In multivariate logistic regression analysis, AKI developed in patients with older age (OR 1.01, 95% confidence interval [CI] 1.00-1.01), male (OR 1.54, 95% CI 44-1.65),

underlying hypertension (adjusted OR 1.29; 95% CI, 1.23-1.35), diabetes (OR 1.25, 95% CI 1.17-1.33), lower serum albumin (OR 0.50, 95% CI 0.47-0.52), and lower hemoglobin (OR 0.93, 95% CI 0.92-0.94), lower eGFR (60-89mL/min/1.73m2, OR 0.86, 95% CI 0.81-0.91; 45-59mL/min/1.73m2, OR 1.50, 95% CI 1.33-1.70; 30-45mL/min/1.73m2, OR 3.36, 95% CI 2.70-4.18; 15-30mL/min/1.73m2, OR 12.85, 95% CI 8.24-20.02), and receiving both surgical resection and chemotherapy (OR 2.42, 95% CI 2.30-2.55) respectively. Genitourinary cancer was the highest risk factor for AKI (OR 2.89, 95% CI 2.50-3.37, reference). During the follow-up period, a total of 23,140 (34.0%) deaths occurred. In the survival analysis, AKI development was an independent risk factor for cancer patients (hazard ratio 1.60, 95% CI 1.19-1.38, P<0.001) even after adjustment of age, sex, co-morbidities, BMI, initial renal function, cancer type, serum albumin and hemoglobin levels, and cancer treatment.

Conclusions : Risk factor for AKI in cancer patients were diverse including hypertension, diabetes, low albumin and hemoglobin, lower eGFR at diagnosis, and cancer type. Moreover, AKI is one of the important risk factors for mortality in cancer patients.

Keywords : Cancer; acute kidney injury; mortality