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Risk Prediction of Contrast Induced Nephropathy in Cancer patients undergoing Contrast Enhanced Computed Tomography under Preventive Measures

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Objectives: Contrast induced nephropathy (CIN) is a major cause of acute kidney injury in patients with chronic kidney disease. Many of cancer patients have risk factors of CIN and frequently need to undergo contrast enhanced computed tomography (CECT). We aimed to develop a risk prediction model of CIN in cancer patients undergoing CECT in outpatient setting.

Methods: From 2009 to 2017, total 2240 cancer patients with estimated glomerular filtration rate (eGFR) < 45 mL/min/m^2 who underwent CECT under CIN preventive measures were used as developmental cohort. Primary outcome was development of CIN, defined as 25% increase of serum creatinine within 2-6 days after contrast exposure. A predictive model was developed using logistic regression analyses. The model was evaluated for prognostic utility in independent cohorts from other tertiary hospital (N=555).

Results: Overall incidence of CIN was 2.5% (55 of 2240). In multivariate analysis, eGFR, diabetes mellitus, and serum albumin level were identified as independent predictors of CIN. A predictive model including eGFR, serum albumin level and diabetes mellitus were developed and risk scores ranged from 0 to 6 points. The model demonstrated good calibration (calibration slope 0.867 and Hosmer and Lemeshow statistic test χ^2 = 2.182, P = 0.702) and fair discriminative power (C statistic = 0.733, 95% CI 0.656-0.810). In the validation cohort, the model also demonstrated good calibration (calibration slope 0.974, Hosmer and Lemeshow statistic test χ^2 = 2.782, P = 0.595) and fair discriminative power (C statistic = 0.749, 95% CI 0.648-0.849).

Conclusions: Prediction model proposed here has good predictive ability for risk of CIN in cancer patients with CKD. This model can contribute to risk stratification of CIN in patients undergoing CECT.