

Outcomes and Predictors of Acute Kidney Injury after Contrast-Enhanced CT in a Large Real-World Retrospective Cohort

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Introduction

Contrast-associated acute kidney injury (CA-AKI) is a significant complication following the administration of iodinated contrast media during diagnostic and therapeutic procedures such as computed tomography (CT) scans. The incidence of CA-AKI varies depending on the patient population and the criteria used for diagnosis, but it is recognized as a considerable source of morbidity and mortality among hospitalized patients. Several risk factors for CA-AKI were previously identify. This study aim to find outcomes of CA-AKI in large cohort and to evaluate risk factors, thereby improve patient outcomes in this setting.

Methods

This retrospective study included hospitalized patients who had perform CT scan with radiocontrast in Songklanagarind Hospital between January 1st, 2013, to June 30th, 2024. CA-AKI events were identified and several variables were evaluated to assess the association between individual predictor factors and CA-AKI.

Results

Seven thousand eight hundred seventy two hospitalized patients performed CT scan with radiocontrast. The median age of patients was 62 years with male predominant. Baseline renal function were measured as estimated glomerular filtration rate, which median was 91 mL/min, as in table 1.

Table 1: Baseline characteristics (N = 7,872)

Characteristics	Median (IQR)	Number (%)
Age (years)	62 (49, 73)	
Sex (male)		4,426 (56.2%)
Hypertension (yes)		2031 (25.8%)
Coronary heart disease (yes)		577 (7.3%)
Heart failure (yes)		389 (4.9%)
Atrial fibrillation (yes)		518 (6.6%)
Diabetes mellitus (yes)		1,109 (14.1%)
Malignancy (yes)		3,334 (42.4%)
CABG in admission (yes)		56 (0.7%)
Diuretic in admission (yes)		2,140 (27.2%)
Amphotericin B in admission (yes)		67 (0.9%)
Creatinine (mg/dL)	0.8 (0.6, 1.1)	
Estimated GFR (mL/min)	91 (64.8, 109)	
Albumin (g/dL)	3.1 (2.6, 3.6)	
Hemoglobin (g/dL)	10.1 (8.7, 11.7)	
Platelet (x 1000 cell/mm³)	253 (171, 355)	
NSS IV infusion before CT (yes)		774 (9.8%)

Results

There were contrast-associated acute kidney injury in 802 patients (10.2%). Severity of acute kidney injury events were classified to KDIGO stage I, III, and III as 585, 103, and 114 events respectively. Moreover 52 patients with CA-AKI received dialysis.

Table 2: Univariate analysis and multivariate analysis for predictor factors and CA-AKI (N = 7,872)

Variables (reference)	Univariate analysis		Multivariate analysis	
	OR (95% CI)	P value	OR (95% CI)	P value
Age (< 75 years)	1.22 (1.03, 1.45)	0.023	0.99 (0.81, 1.20)	0.919
Sex (female)	1.12 (0.97, 1.30)	0.132	1.18 (1.00, 1.38)	0.046
Hypertension (no)	1.16 (0.98, 1.36)	0.073	0.99 (0.82, 1.19)	0.887
Heart failure (no)	2.06 (1.57, 2.68)	< 0.001	1.24 (0.90, 1.69)	0.178
Atrial fibrillation (no)	1.96 (1.53, 2.48)	< 0.001	1.36 (1.03, 1.77)	0.026
Malignancy (no)	0.77 (0.66, 0.89)	< 0.001	0.77 (0.65, 0.91)	0.002
CABG in admission (no)	3.90 (2.14, 6.86)	< 0.001	2.62 (1.35, 4.89)	0.003
Diuretic in admission (no)	2.19 (1.89, 2.55)	< 0.001	1.64 (1.38, 1.94)	< 0.001
Amphotericin B in admission (no)	3.29 (1.86, 5.57)	< 0.001	2.63 (1.43, 4.65)	0.001
Pulse rate (< 100/min)	2.04 (1.75, 2.36)	< 0.001	2.07 (1.76, 2.44)	< 0.001
Estimated GFR (>= 60 mL/min)	2.17 (1.85, 2.53)	< 0.001	1.72 (1.36, 2.15)	< 0.001
Hemoglobin (>= 10 g/dL)	1.31 (1.13, 1.52)	< 0.001	1.06 (0.90, 1.25)	0.466
Platelet (>= 100,000 cell/mm³)	1.77 (1.43, 2.18)	< 0.001	1.42 (1.12, 1.78)	0.003
NSS IV infusion before CT (no)	0.73 (0.55, 0.96)	0.026	0.74 (0.56, 0.98)	0.039

To evaluate association of predictor factors and CA-AKI. Factors that P value < 0.2 in univariate analysis were included to multivariate logistic regression model. Risk factors of CA-AKI were underlying atrial fibrillation, eGFR < 60 mL/min, patients who received diuretics or amphotericin B or CABG in admission, tachycardia (pulse rate >= 100/min), thrombocytopenia (platelet < 100,000 cell/mm³). Preventive factors of CA-AKI were underlying malignancy, patients who received before CT scan, as in table 2.

Discussions

Predictive factors of CA-AKI were concordant with previous study. Patients who had malignancy may be cachexia and false low AKI events due to lower creatinine production.

Conclusions

This retrospective cohort study found 10.2% of hospitalized patients had CA-AKI after performed CT scan with radiocontrast. Several factors were associated with CA-AKI and might to improved risk stratification and patient outcomes.