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Does Contrast-Enhanced CT Accelerate CKD Progression? A Retrospective Analysis in Stage 4 CKD Patients

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Objectives : Iodine-based contrast agents can cause adverse reactions such as hypersensitivity and contrast-induced nephropathy(CIN). Although multiple studies have established that the risk of CIN increases with declining renal function, few have examined the long-term effects of contrast-enhanced CT(Contrast CT, CT(CE)) on the progression of chronic kidney disease(CKD). Therefore, this study aimed to determine whether CT(CE) exposure affects CKD progression in patients with Stage 4 CKD.

Methods : A retrospective analysis was performed on CKD patients who visited the Department of Nephrology between Mar, 2001, and Feb 2024. The estimated glomerular filtration rate(eGFR) was calculated using the 2021 CKD-EPI-Cr equation. Patients whose eGFR declined below 30 mL/min during the observation period were enrolled. Patients with acute kidney injury, prior CRRT, or kidney transplantation are excluded. CKD progression was defined as when two consecutive eGFR declined below 15 mL/min. Patients who underwent CT(CE) from 180 days before the onset of Stage 4 CKD until reaching Stage 5 were classified as the exposure group.

Results : In total, 408 patients (mean age, 57.2 years; 58.3% male) were included. Among these patients, 52 were exposed to at least one CT(CE). Except for a history of stroke, there were no differences between the CT(CE)-exposure and non-exposure groups. Following 1:1 propensity score matching, each 49 patients were compared (Table 1). Before matching, CKD Stage 5 progression occurred in 218 non-exposed and 30 exposed patients, with median survival times of 1072 days (95% CI: 938–1336) and 2318 days (95% CI: 2074–3371), respectively ($p=0.0057$), indicating slower progression in the CT(CE) group. After matching, median survival times were 1309 days (95% CI: 833–NA) for non-exposed and 2247 days (95% CI: 2074–3371) for exposed patients, with no statistically significant difference observed ($p=0.38$). (Figure 1)

Conclusions : In patients with Stage 4 CKD, contrast-enhanced CT exposure was not associated with accelerated progression to Stage 5.

Table 1.png



Variable	Before Matching			After Matching		
	Non-exposure	CT(CE) Exposure	p-value	Non-exposure	CT(CE) Exposure	p-value
n	356	52		49	49	
AGE (mean (SD))	56.75 (14.90)	59.87 (13.67)	0.156	59.59 (13.60)	59.55 (14.00)	0.968
SEX = M (%)	203 (57.0)	35 (67.3)	0.210	34 (69.4)	32 (65.3)	0.629
TPCR (mean (SD))	4886.61 (4279.66)	4200.39 (4148.78)	0.279	4659.78 (3964.50)	4367.67 (4224.19)	0.716
DM (%)	193 (54.2)	29 (55.8)	0.951	31 (63.3)	27 (55.1)	0.538
HTN (%)	306 (86.0)	50 (96.2)	0.066	47 (95.9)	47 (95.9)	1.000
DL (%)	182 (51.1)	34 (65.4)	0.076	36 (73.5)	32 (65.3)	0.511
CHF (%)	48 (13.5)	12 (23.1)	0.106	8 (16.3)	11 (22.4)	0.609
CVA (%)	115 (32.3)	27 (51.9)	0.009	30 (61.2)	24 (49.0)	0.310
ARB (%)	309 (86.8)	48 (92.3)	0.369	46 (93.9)	45 (91.8)	1.000
BB (%)	159 (44.7)	23 (44.2)	1.000	24 (49.0)	22 (44.9)	0.840
CCB (%)	251 (70.5)	43 (82.7)	0.096	39 (79.6)	40 (81.6)	1.000
Diuretics (%)	147 (41.3)	28 (53.8)	0.119	22 (44.9)	26 (53.1)	0.544
SGLT2 (%)	33 (9.3)	6 (11.5)	0.789	3 (6.1)	4 (8.2)	1.000
MRA (%)	32 (9.0)	6 (11.5)	0.737	3 (6.1)	6 (12.2)	0.484

Table 1.png

