Long-term Renal Outcome Post Multimodal Computed Tomography in Stroke Evaluation

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INTRODUCTION

Multimodal computed tomography (MMCT) is an invaluable tool in the evaluation of acute stroke[1]. Contrast-induced acute kidney injury (AKI) is defined as an acute rise in serum creatinine (SCr) solely attributed to contrast administration, in the absence of renal confounders[2]. A local study led by Ang et al demonstrated the risk of contrast-associated AKI (CA-AKI) is negligible if adjusted for renal confounders[3]. We aim to provide a complementary study with long-term renal follow up.

AIM

To assess the risk of CA-AKI and long-term renal outcome at >30 days post MMCT.

METHODS

Retrospective analysis was performed on all patients presenting to Barwon Health with suspected stroke from January 2019 to June 2020 who had undergone MMCT. SCr at baseline and post contrast were documented during at-risk period (day 2-5) and at >30 days (up to 120 days). Relationship between CA-AKI and risk factors such as age, diabetes mellitus, cardiac disease, baseline eGFR and contrast volume was also evaluated.

RESULTS

We identified 776 cases (538 were excluded due to incomplete biochemistry data available), leaving 238 cases (Table 1). At >30 days, 144 cases (60.5%) had biochemistry available. The incidence of CA-AKI was 7.6% (n/N = 18/238, 95% CI = 4.2-11.0) (Figure 1a). All CA-AKI cases had renal confounders such as sepsis, dehydration, cardiogenic shock, obstructive uropathy and nephrotoxins (Figure 1b). No persistent or new AKI at >30 days was found in all cases studied. Majority had SCr returning to baseline by day 14 (Figure 1c). Pre-existing chronic kidney disease with an eGFR <30 and additional contrast load had higher odd ratios however were not statically significant (Table 2).

Table 1: Baseline characteristics

Gender: n (%)	
Male	138 (58.0)
Female	100 (42.0)
Age	
Median	74
Interquartile range	63 – 83
Baseline NIHSS	
Median	4
Interquartile range	2 – 9
Thrombolysis cases: n (%)	36 (15.1)
Pre-existing CA-AKI risk factors: n (%)	
Diabetes mellitus	62 (26.1)
Heart failure/ischemic heart disease	72 (30.3)
Baseline eGFR	
Median	62
25th – 75th percentile	46 – 80
Range	16 – >90
eGFR >90: n(%)	29 (12.2)
eGFR <60	108 (45.4)
eGFR <45	57 (23.9)
eGFR <30	17 (7.1)
Baseline SCr	
Median	96
Interquartile range	79 – 116
Range	51 – 335
Type of neuroimaging: n(%)	
MMCT including CTA/CTP	217 (91.2)
CTA only	20 (8.4)
CTP only	1 (0.4)
Digital subtraction angiography	17 (7.2)
Contrast use: n(%)	
150mL	217 (91.2)
100mL	20 (8.4)
50mL	1 (0.4)
Digital subtraction angiography	17 (7.2)
>150mL (double contrast)*	22 (9.2)

* Additional contrast administration from repeat CTA, CTP, or DSA

Table 2: Relationship between risk factors and CA-AKI

Risk factor	OR (95% CI, p value) [unadjusted]
Age	1.00 (0.97 – 1.03), p=0.880
Diabetes mellitus	1.91 (0.70 – 5.18), p=0.204
Heart failure/ischemic heart disease	1.52 (0.57 – 4.04), p=0.406
Baseline eGFR	
eGFR ≥60ml/min (n=130)	Ref
eGFR 45-59ml/min (n=51)	0.75 (0.20 – 2.86), p=0.674
eGFR 30-44ml/min (n=40)	0.63 (0.13 – 3.04), p=0.567
eGFR <30ml/min (n=17)	2.57 (0.63 – 10.52), p=0.189
Type of imaging/contrast volume (mL)	
MMCT including CTA/CTP (150mL)	0.45 (0.12 – 1.69), p=0.234
CTA only (100mL)	1.40 (0.30 – 6.60), p=0.668
DSA	1.82 (0.38, 8.75), p=0.454
Double contrast (>150mL)	2.12 (0.56 – 7.98), p=0.269

Figure 1a: CA-AKI incidence

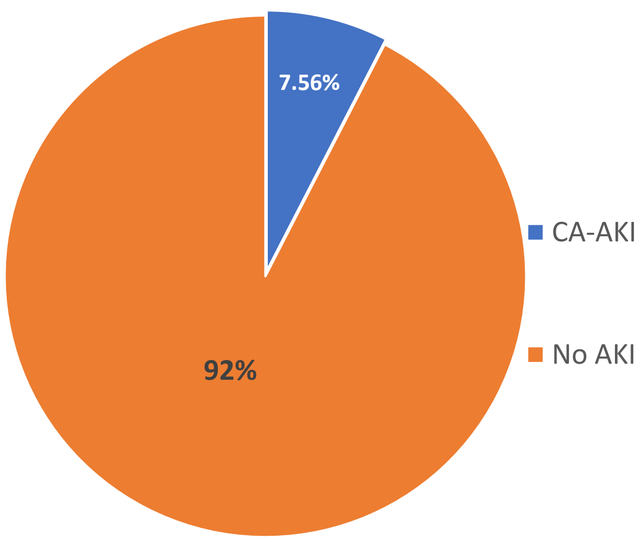


Figure 1b: Renal confounders

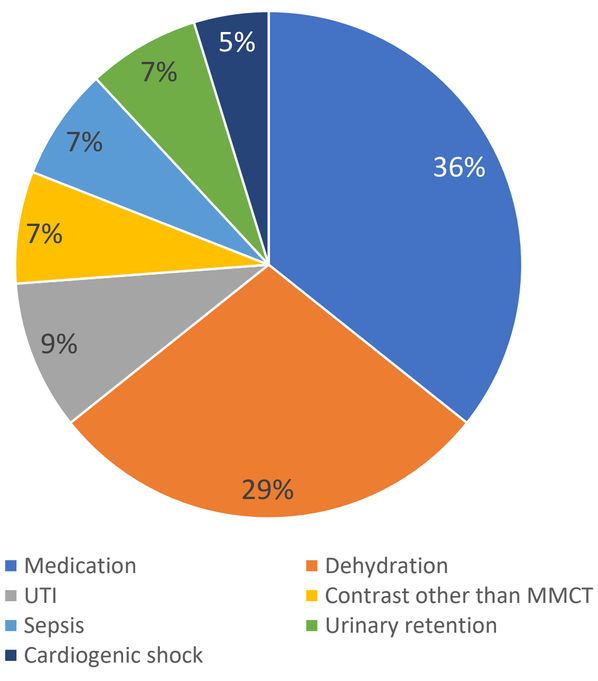
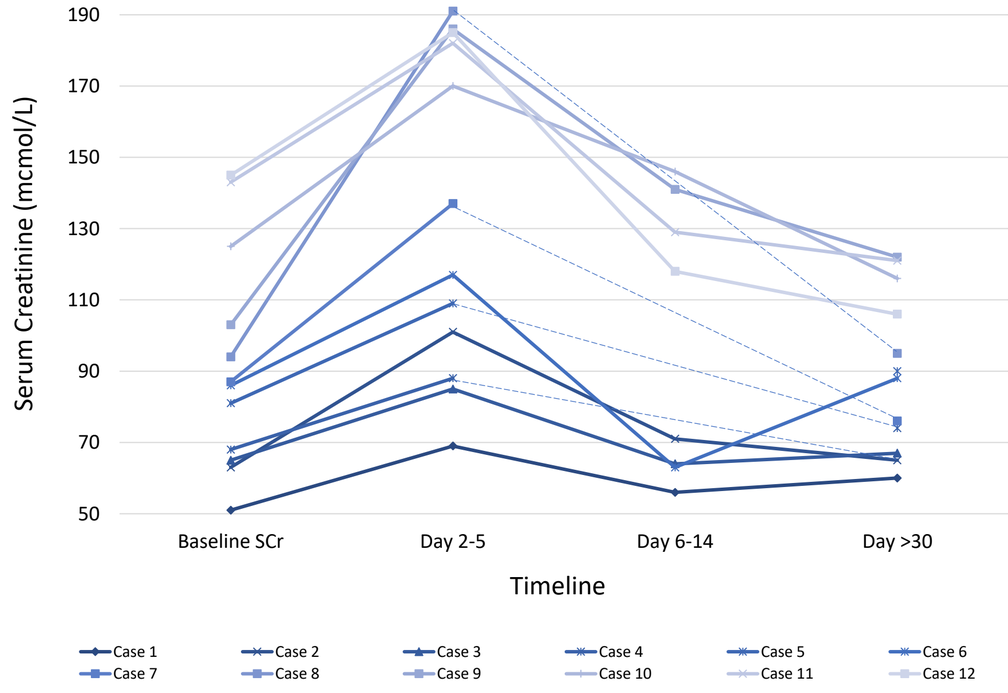


Figure 1c: Serum Creatinine Trend of Individual CA-AKI Cases



CONCLUSION

The long-term renal outcome post MMCT in stroke evaluation is favourable at >30 days with no new or persistent AKI.

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